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Figures- Attachment 1

3.0 AFFECTED ENVIRONMENT

This chapter discusses the physical, biological, social, and economic factors as they currently exist within the MBPA and surrounding region. Management issues identified by the BLM VFO, public scoping, and interdisciplinary analysis of the MBPA have provided guidance on the material presented herein.

The area of the affected environment for individual resources was assessed based on the area of potential direct and indirect environmental impacts. For most resources, the affected environment includes the immediate boundaries of the MBPA. However, some resources (e.g., watersheds, air quality, and socioeconomics) are addressed in a larger regional context.

3.1 GENERAL SETTING

The MBPA is located within the Uinta Basin of the Colorado Plateau physiographic province. The basin is a bowl-shaped structural and sedimentary feature that trends roughly east to west, has a maximum width of about 115 miles, and covers an area of approximately 10,890 square miles. The basin is bounded on the north by the Uinta Mountains and on the east by the Douglas Creek Arch, with portions of the Wasatch Range and the Roan Cliffs forming its southern and western boundaries.

Elevation within the MBPA ranges from approximately 4,632 feet above mean sea level (amsl) in the eastern portion near the Green River, to approximately 6,867 feet amsl in the southwestern portion near Gilsonite Draw. Numerous drainages transect the MBPA, including Wells Draw, Castle Peak Draw, Petes Wash, Sheep Wash, Big Wash, and a number of other unnamed ephemeral features. These drainages, in combination with the plateaus of Pariette Bench and Eigh Mile Flat, create a pattern of uplands and lowlands oriented southwest to northeast.

The vegetation within the MBPA and surrounding region consists of typical Intermountain Basin shrubland associations. This region mixes an array of geographic substrates, topographic features, climatic regimes, soil types, and other physical factors to produce a mosaic of floristic components and associated natural habitats. These communities are often mixed, transitional, or widely distributed.

The MBPA encompasses approximately 119,743 acres of land within southeast Duchesne County and southwest Uintah County. The MBPA spans a distance of approximately 25 miles east to west and 9 miles north to south. The Town of Vernal is approximately 33 miles northeast of the MBPA boundary, and Myton, Utah, is located approximately 5.5 miles to the north. Land ownership in the MBPA is approximately 87 percent Federal (managed by the BLM), approximately 11 percent State of Utah (managed SITLA), and approximately 2 percent private. Mineral interests are owned by the BLM (89 percent), the State of Utah (10 percent), and private interests (less than 1 percent). Lands with separate surface and mineral ownership, also known as “split estate lands,” comprise approximately 18 percent of land within the MBPA.

3.2 AIR QUALITY

Regional air quality is influenced by a combination of factors including climate, meteorology, the magnitude and spatial distribution of air pollution sources, and the chemical properties of emitted pollutants. Within the lower atmosphere, regional and local scale air masses interact with regional topography to influence atmospheric dispersion and transport of pollutants. The following sections summarize the climatic conditions and existing air quality within the MBPA and surrounding region for the Proposed Action and alternatives.

The MBPA covers areas both within and outside of the exterior boundaries of Indian Country. The EPA has primary regulatory authority for implementing various environmental statutes including the Federal CAA and the permitting of air emission sources within the exterior boundaries of Indian Country. All other areas are regulated by the Utah Department of Environmental Quality (UDEQ). Specifically, the Division of Air Quality (DAQ) has the regulatory authority to issue air permits for stationary point sources outside of Indian Country, though they typically do not permit mobile and temporary sources such as drill rigs.

3.2.1 Climate

The MBPA is located in the Uinta Basin, a semi-arid, mid-continental climate regime. The elevation ranges from approximately 4,632 to 6,867 feet amsl. The terrain gently slopes downward from the southwest to the northeast. The Uinta Basin is bordered by the Wasatch Range to the west, which extends north and south through the middle of the State, and by the High Uinta Mountains to the north, which extend east and west through the northeast portion of the State.

3.2.1.1 Temperature and Precipitation

The closest station to the MBPA with a complete and current climatic record is located in Myton, Utah. The Myton station is located approximately 11 miles north of the geographic center of the MBPA, with an elevation of 5,080 feet amsl. **Table 3.2.1.1-1** summarizes the mean temperature range, mean total precipitation, and mean total snowfall data by month from 1915-2012 (WRCC 2012a).

The annual mean precipitation at Myton is 6.86 inches, and ranges from a minimum of 1.34 inches recorded in 1974, to a maximum of 13.71 inches recorded in 1941. On average, February is the driest month of the year with a monthly mean precipitation of 0.33 inches, and October is the wettest month with a monthly mean precipitation of 0.82 inches. The annual average snowfall is 14.2 inches, with December being the snowiest month. A maximum annual snowfall of 50.7 inches was recorded in 1949 (WRCC 2012b).

The annual mean temperature at Myton is 46.1 degrees Fahrenheit (^{o}F). However, abundant sunshine and rapid nighttime cooling result in a wide daily range in temperature. Wide seasonal temperature variations typical of a mid-continental climate regime are also common. Average monthly winter temperatures range from about 7^{o}F to 34^{o}F, while average summer temperatures range from 51^{o}F to 87^{o}F. Recorded daily extreme temperatures are minus 39 ^{o}F in 1937 and 104 ^{o}F in 1958 (WRCC 2012c).

Table 3.2.1.1-1. Temperature, Precipitation, and Snowfall Data at Myton, Utah

Month	Average Temperature Range (in degrees Fahrenheit)	Average Total Precipitation (inches)	Average Total Snowfall (inches)
January	2.1 - 29.5	0.36	3.3
February	9.9 – 37.6	0.33	2.6
March	22.2 – 51.9	0.44	1.8
April	31.3 – 63.5	0.60	0.5
May	40.0 – 73.4	0.70	0.1
June	47.3 – 83.2	0.59	0.0
July	54.5 – 90.0	0.62	0.0
August	52.5– 87.7	0.78	0.0
September	43.7 – 79.0	0.81	0.0
October	32.6 – 65.1	0.82	0.3
November	19.5 – 47.5	0.42	1.8
December	8.3 – 33.2	0.40	3.8
Total Annual Average	**30.3 – 61.8**	**6.86**	**14.2**

Source: WRCC 2012a. Data collected at Myton, Utah from 8/27/1915 to 2/25/2012.

3.2.1.2 Winds and Atmospheric Stability

In addition to the climatic data discussed in **Section 3.2.1.1**, additional sources of meteorological data are available in and near the MBPA. Several Remote Air Weather Stations broadcast hourly wind speed and direction, temperature, and relative humidity to the National Interagency Fire Center; UDEQ-operated air quality monitoring stations (Ouray and Redwash); and additional special study and research monitors (e.g., the 2012 Uintah Basin Winter Ozone and Air Quality Study that added an ozone monitor at Pariette Draw, among other locations).

According to UDEQ, the nearest and most complete wind speed and direction data set that is suitable for air quality impact modeling analyses and representative of the MBPA is the Vernal, Utah station, which is located approximately 38 miles to the northeast of the geographic center of the MBPA. **Figure 3.2.1.2-1 (Attachment 1)** illustrates a wind rose that depicts wind speed and direction based on 5 years of data collection (period 2005 through 2009) at the Vernal station (UDEQ-DAQ 2011). Note that the data represents the direction from which the wind is coming. As shown, winds originate predominately from the west-northwest. The average measured wind speed is 4.8 miles per hour (2.2 meters/second). Winds are calm 10 percent of the time. Although local terrain effects will influence the wind profiles specific to the MBPA, data from the Vernal station are representative of the rural, gently sloping terrain of the MBPA.

Wind speed and direction are important to the dilution and transport of air pollutants. Wind direction will determine where air pollutants are transported. Based on the Vernal wind rose, air pollutants will be transported in an easterly direction within and out of the MBPA. Wind speed is a determining factor in the concentration of air pollutants. Dispersion of air pollutants increases with increasing wind speeds, thereby decreasing air pollutant concentrations.

The degree of stability in the atmosphere is also significant to the dispersion of emitted pollutants. During stable conditions, vertical movement in the atmosphere is limited and the dispersion of pollutants is inhibited. Conversely, during unstable conditions, upward and downward movement in the atmosphere prevails, and dispersion of pollutants in the atmosphere is enhanced. Temperature inversions (when temperatures increase with height) can result in very stable conditions with virtually no vertical air motion. The region of the MBPA will typically have more large scale temperature inversions in the winter rather than in the summer due to colder stable air masses settling closer to the ground. Afternoons in the region of the MBPA typically have increasing instability due to warming.

3.2.2 Regulatory Environment

Although the purpose of this EIS is not to delegate permitting authority, activities under the Proposed Action and alternatives will be regulated under the CAA of 1970, as amended (42 U.S.C. 7401, et seq.). The following are the applicable sections of the CAA and how they would apply to the Proposed Action and alternatives.

3.2.2.1 National Ambient Air Quality Standards

Ambient air quality in a given location may be characterized by comparing the concentration of various pollutants in the ambient air with the standards set by federal and state agencies. Under the authority of the CAA, the EPA has established nationwide air quality standards, known as the National Ambient Air Quality Standards (NAAQS). These standards represent the maximum allowable atmospheric concentration of the criteria pollutants. There are primary and secondary standards for these pollutants. The primary standards were established to protect the public health within an adequate margin of safety; the secondary standards were established to protect the public welfare from any known or anticipated adverse effects of a pollutant. Pollutants for which standards have been set include carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter less than 10 or 2.5 microns in aerodynamic diameter (PM_{10} and $PM_{2.5}$), ozone (O_{3}), sulfur dioxide (SO_2), and lead. **Table 3.2.2.1-1** lists the current NAAQS and averaging times for each criteria pollutant. Individual states must meet the NAAQS but may adopt their own standards that are at least as stringent as the NAAQS. Utah has adopted the NAAQS as the State ambient air quality standards.

If the ambient air in a specified region meets the NAAQS, it is designated as an attainment area. Conversely, if a region does not meet the NAAQS it is designated as nonattainment. Determinations for attainment and nonattainment are made by analyzing air monitoring data. If an area does not have adequate air monitoring data to make a determination, it is designated unclassified and treated as an attainment area. The Uinta Basin (where the MBPA is located) is designated as attainment or unclassified for all criteria pollutants.

Table 3.2.2.1-1. National Ambient Air Quality Standards and Prevention of Significant Deterioration (PSD) Class II Increments

Criteria Pollutant	Averaging Period(s)	NAAQS[a]	PSD Class I Increments ($\mu g/m^3$)[b]	PSD Class II Increments ($\mu g/m^3$)[b]
CO	1-hour 8-hour	35 ppm (40,000 $\mu g/m^3$) [c] 9 ppm (10,000 $\mu g/m^3$) [c]	None None	None None
NO_2	1-hour Annual	100 ppb (188 $\mu g/m^3$) [d] 0.053 ppm (100 $\mu g/m^3$) [e]	None 2.5	None 25
PM_{10}	24-hour Annual	150 $\mu g/m^3$ [f] -----	8 4	30 17
$PM_{2.5}$	24-hour Annual	35 $\mu g/m^3$ [d] 12 $\mu g/m^3$ [g]	2 1	9 4
O_3	8-hour	0.075 ppm [h]	None	None
SO_2	1-hour 3-hour 24-hour Annual	75 ppb (196 $\mu g/m^3$) [i] 0.5 ppm (1,300 $\mu g/m^3$) [c] ----- -----	None 25 5 2	None 512 91 20
Lead	Rolling 3 month	0.15 $\mu g/m^3$ [j]	None	None

[a] Source: 40 CFR Part 50
[b] Source: 40 CFR Part 51.166(c)
[c] Not to be exceeded more than once per year.
[d] 98th percentile averaged over 3 years.
[e] Annual mean.
[f] Not to be exceeded more than once per year on average over 3 years.
[g] Annual mean, averaged over 3 years.
[h] Annual fourth-highest daily maximum 8-hour ozone concentration averaged over 3 years.
[i] 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years.
[j] Not to be exceeded.

3.2.2.2 Prevention of Significant Deterioration

Under the PSD provisions of the CAA (40 CFR 50.166), incremental increases of specific pollutant concentrations are limited above a legally defined baseline level for new or modified major stationary sources in attainment or unclassified areas. Under PSD provision, major stationary sources are defined as those that emit 100 tons per year of any criteria pollutant for the source categories specifically listed in 40 CFR 51.166 or those that emit 250 tons per year for all other source categories. Emission sources corresponding to the Proposed Action or alternatives would be considered a major stationary source under PSD if they emitted 250 tons per year of a criteria pollutant because they are not specifically listed in the source categories.

The PSD increments are based on area classes. Many national parks and wilderness areas are designated as PSD Class I. The PSD program protects air quality within Class I areas by allowing only slight incremental increases in pollutant concentrations. Areas of the State not designated as PSD Class I are classified as Class II. For Class II areas, greater incremental increases in ambient pollutant concentrations are allowed. The MBPA and surrounding area is designated as PSD Class II. The PSD increments for Class II areas are presented in **Table 3.2.2.1-1**. The closest Class I areas to the MBPA are Arches National Park (85 miles south) and Canyonlands National Park (106 miles south). Dinosaur National

Monument is a sensitive Class II area located approximately 40 miles northeast of the MBPA. The term "sensitive Class II area" will be used to describe those Class II parks and wilderness areas where the Federal Land Managers (FLMs) have air quality concerns. Even though sensitive Class II areas do not receive the same protection as Class I areas under the Clean Air Act, FLMs have other mandates to protect those areas.

3.2.2.3 New Source Performance Standards

New Source Performance Standards (NSPS) are pollution control standards developed by the EPA under the authority of the CAA (40 CFR Part 60). NSPS apply to specific categories of new, modified, and reconstructed stationary sources and define emission limits for specified pollutants, compliance requirements, monitoring requirements, as well as test methods and procedures. NSPS Standards of Performance that would potentially be applicable to the Proposed Action and alternatives include:

- Subpart K: Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978
- Subpart Ka: Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984
- Subpart Kb: Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984
- Subpart KKK: Equipment Leaks of Volatile Organic Compounds (VOCs) from Onshore Natural Gas Processing Plants
- Subpart LLL: Onshore Natural Gas Processing: SO_2 Emissions
- Subpart IIII: Stationary Compression Ignition Internal Combustion Engines
- Subpart JJJJ: Stationary Spark Ignition Internal Combustion Engines
- Subpart KKKK: Stationary Combustion Turbines
- Subpart OOOO: Crude Oil and Natural Gas Production, Transmission and Distribution

3.2.2.4 Hazardous Air Pollutants

Hazardous Air Pollutants (HAPs) are pollutants that are known and are suspected of causing cancer or other serious health effects, or can cause adverse environmental and ecological impacts. The EPA has classified 187 air pollutants as HAPs under the amended CAA of 1990. Examples of listed HAPs associated with the oil and gas industry include formaldehyde, benzene, toluene, ethylbenzene, xylene (BTEX compounds), and normal-hexane (n-hexane).

There are no applicable Federal or State of Utah ambient air quality standards for HAPs; therefore, reference concentrations (RfC) for chronic inhalation exposure and Reference Exposure Levels (REL) for acute inhalation exposures are used to evaluate potential impacts of HAPs. RfCs represent an estimate of the continuous inhalation exposure rate to the human population without an appreciable risk of harmful effects. The REL is the acute concentration at or below which no adverse health effects are expected. Both the RfC and REL guideline values are for non-cancer effects. The State of Utah has adopted Toxic

Screening Levels (TSLs), which are applied during the air permitting process to assist in the evaluation of HAPs released into the atmosphere.

Under Section 112 of the CAA, the EPA is required to develop regulations establishing National Emission Standards for Hazardous Air Pollutants (NESHAPs) for all specific source categories. These standards are established to reflect the maximum degree of reduction in HAP emissions determined to be achievable through application of Maximum Achievable Control Technology (MACT). The potentially applicable MACT standards (40 CFR Part 63) for the Proposed Action and alternatives include the following National Emission Standards for HAPs:

- Subpart HH: Oil and Natural Gas Production Facilities
- Subpart HHH: Natural Gas Transmission and Storage Facilities
- Subpart EEEE: Organic Liquids Distribution (Non-Gasoline)
- Subpart YYYY: Stationary Combustion Turbines
- Subpart ZZZZ: Stationary Reciprocating Internal Combustion Engines (RICE)
- Subpart DDDDD: Industrial, Commercial, and Institutional Boilers and Process Heaters
- Subpart JJJJJJ: Industrial, Commercial, and Institutional Boilers Area Sources

3.2.2.5 Greenhouse Gases

Greenhouse gases (GHGs) exist in the earth's atmosphere and absorb outgoing infrared radiation, thus trapping heat in the atmosphere. Some GHGs, such as water vapor, carbon dioxide, methane, and nitrous oxide occur naturally, while others come from anthropogenic activities (i.e., resulting from or produced directly by human activities). Other GHGs, such as hydrofluorocarbons, result only from anthropogenic activities. The Proposed Action and alternatives would be a source of GHGs, including carbon dioxide, methane, and nitrous oxide.

The CEQ released draft guidance in 2010 on how Federal agencies should consider and evaluate GHG emissions and climate change under NEPA. If a proposed action is expected to cause direct emissions of 25,000 metric tons or more of carbon dioxide-equivalent GHG emissions on an annual basis, a quantitative and qualitative assessment should be considered together with the mitigation measures and reasonable alternatives to reduce GHG emissions.

The EPA published Mandatory Reporting of Greenhouse Gases (40 CFR Part 98) in October 2009. This rule requires mandatory reporting of GHG emissions for 41 source categories that generally emit more than 25,000 metric tons or more of carbon dioxide-equivalent GHG emissions on an annual basis. This rule does not provide any emission limits for GHGs. Additionally, Subpart W of 40 CFR Part 98 was issued in November 2010. This Subpart specifically addresses reporting of GHG from Petroleum and Natural Gas Systems. The Proposed Action and alternatives may also be subject to Subpart C of 40 CFR Part 98, which regulates reporting of General Stationary Fuel Combustion Sources.

Greenhouse gases, such as carbon dioxide, methane, and nitrous oxide, are chemically stable and persist in the atmosphere. They can also become well mixed throughout the atmosphere before being removed by physical or chemical processes. Because these stable gases are well mixed, the impacts from their presence occur over a larger region. For this reason, GHG concentrations are typically discussed on a global or regional scale rather than a local airshed; likewise, the impacts of atmospheric concentrations of GHGs are also discussed on a global or regional scale.

3.2.3 Existing Air Quality

3.2.3.1 Existing Sources of Air Pollution

As a rural area, the Uinta Basin has seen recent oil and gas development on Tribal, Federal, and private lands or minerals. Existing point, area sources, and fugitive sources of air pollution within the MBPA and surrounding region include the following, among others:

- Exhaust emissions of mainly CO, NOx, and diesel exhaust particulate from drill rig engines associated with oil and gas exploration and development.
- Fugitive dust (PM_{10} and $PM_{2.5}$) and other emissions associated with construction and development of oil and gas well sites.
- Emissions of CO, NOx, VOC, PM_{10}, and $PM_{2.5}$ from equipment located at producing oil and gas well heads (e.g., heaters, separators, tanks, pumpjack engines, etc.).
- Exhaust emissions (primarily CO, oxides of nitrogen (NOx), and formaldehyde) from natural gas fired compressor engines used in production of natural gas.
- Natural gas dehydrator still-vent emissions of HAPs, including benzene, toluene, ethylbenzene, xylene, and n-hexane.
- Gasoline and diesel-fueled vehicle tailpipe emissions of VOCs, NOx, CO, SO_2, PM_{10} or $PM_{2.5}$.
- Fugitive dust (in the form of PM_{10} and $PM_{2.5}$) from vehicle traffic on unpaved and paved roads, wind erosion in areas of soil disturbance, and road sanding during winter months.
- Long range transport of pollutants from distant sources contributing to regional haze.
- SO_2, NOx, and fugitive dust emissions from coal-fired power plants and coal mining and processing.
- Local sources of emissions associated with typical human activity (e.g., particulate emissions from wood burning).

3.2.3.2 Existing Air Pollutant Monitoring Data

The Uinta Basin is designated as attainment/unclassified for all criteria pollutants. Site-specific air quality monitoring data are not available for the MBPA; however, there are air pollutant monitoring stations elsewhere in the Uinta Basin. UDEQ-DAQ also estimates background air quality values as guidance for regulatory modeling of permitted sources to ensure NAAQS compliance. These background values are used in dispersion models by adding them to project specific air quality impacts so that an evaluation can be made on whether the source will meet NAAQS. **Table 3.2.3.2-1** lists the latest ambient air quality background values for those criteria pollutants and provides averaging times from which an NAAQS has been established. The values in the table come from the Air Quality Technical Support Document (AQTSD), which is included as an appendix to this EIS (refer to **Appendix B**, Section 3.2). Lead is not included in the table because lead emissions from the Proposed Action and alternatives are *de minimis*. For additional information, see the discussion in **Section 3.2** of this EIS.

Table 3.2.3.2-1. Pre-Project Background Ambient Air Quality in the Uinta Basin[a]

Criteria Pollutant	Averaging Period(s)	Uinta Basin Background Concentration ($\mu g/m^3$)	NAAQS[b]
CO	1-hour 8-hour	2,641 1,657	35 ppm (40,000 $\mu g/m^3$) 9 ppm (10,000 $\mu g/m^3$)
NO_2	1-hour Annual	57.7 7.3	100 ppb (188 $\mu g/m^3$) 0.053 ppm (100 $\mu g/m^3$)
O_3	8-hour	184 (0.094 ppm)	0.075 ppm (147 $\mu g/m^3$)
PM_{10}	24-hour	18.7	150 $\mu g/m^3$
$PM_{2.5}$	24-hour Annual	20.5 8.8	35 $\mu g/m^3$ 12 $\mu g/m^3$
SO_2	1-hour 3-hour	20.1 14.3	75 ppb (196 $\mu g/m^3$) 0.5 ppm (1,300 $\mu g/m^3$)

[a] See discussions in **Section 3.2** and **Appendix B** (Table 3-3 of the AQTSD) of this EIS for how the background values were established. The background ozone value is the average of the high-fourth-high values for 2009/2010 through 2011/2012 for both the Ouray and Redwash monitoring stations combined.
[b] See **Table 3.2.2.1-1**, which defines the NAAQS.

As shown in **Table 3.2.3.2-1**, the air monitoring background numerical value for ground-level ozone is higher than the NAAQS. Active ozone monitoring in the Uinta Basin began in the summer of 2009. Numerous monitoring sites throughout the Basin have recorded exceedences of the 8-hour ozone standard during the winter months (January through March 2010 and 2011). No exceedances of the standard were recorded during April through December of 2010 and 2011 (EPA 2012a) or during the winter of 2011/2012, but exceedances apparently did occur during the winter of 2012/2013. According to the EPA, during calendar year 2011 there were 21 days of exceedances of the 8-hour ozone standard at the Redwash monitoring station, 22 days at the Ouray station, and 8 days at Dinosaur National Park (Utah location). During calendar year 2010 there were 30 and 38 days of exceedance at Redwash and Ouray, respectively (EPA 2012a). Quality assured and summarized data from the winter of 2012/2013 are not yet available. However, raw data indicate that the NAAQS for ozone was exceeded at both the Ouray and Redwash monitors during the 2012/2013 winter. As discussed previously, the exceedances all occurred during the winter months. Ozone is a secondary pollutant that is formed by a chemical reaction between NO_X and VOCs in the presence of heat and sunlight. As a result, it is generally known as a summertime air pollutant; however, ozone exceedences in the Uinta Basin only occur to date during the wintertime. Precursor sources of ozone include motor vehicle exhaust and industrial emissions, gasoline vapors, some tree and other plant species emissions, wood burning, chemical solvents, and other sources.

The chemical and physical properties leading to this winter ozone formation is not currently well understood. Apparently, high concentrations of ozone are being formed under a “cold pool” process whereby stagnant air conditions with very low mixing heights form under clear skies with snow-covered ground and abundant sunlight and combine with area precursor emissions (NO_X and VOCs) to create intense episodes of ozone. This phenomenon has also been observed in similar types of locations in Wyoming. Winter ozone formation is a newly recognized issue, and the methods of analyzing and managing this problem are still in development. Based on the emission inventories developed for Uintah County, the most likely dominant source of ozone precursors in the Uinta Basin are oil and gas operations in the vicinity of the monitors. The monitors are located in remote areas where impacts from other human activities are unlikely to meaningfully contribute to this ozone formation. While ozone precursors can be transported large distances during the meteorological conditions under which this cold pool ozone formation is occurring, contributions of ozone precursors from long range transport are expected to be *de minimis*. At the present time, ozone exceedences in this area seem to be confined to the winter months during periods of intense surface inversions and low mixing heights (USU EDL 2011).

Since 2010, the National Park Service (NPS) has been monitoring ozone concentrations in several national parks and monuments using portable and permanent instruments. Two of the reporting locations are the Canyonlands National Park and Dinosaur National Monument. There were four monitored exceedances in Dinosaur National Monument during the months of April through September in 2012, and two exceedances in Canyonlands National Park. These summertime exceedances, along with the summer ozone values reported in Dinosaur National Monument, were typical of ozone values monitored throughout the Intermountain West that followed regional patterns both in frequency and concentrations (NPS 2012).

The NPS Rocky Mountain Atmospheric Nitrogen and Sulfur (RoMANS) Study evaluated, observed, and modeled aerosol species concentrations and wet deposition (NPS 2010). The western-most study plot was Dinosaur National Monument, which was modeled and monitored. Field observations for the RoMANS Study were obtained during the summer of 2006. The goals of the RoMANS Study were to evaluate the meteorology, relative contribution of emissions sources, and relative contribution of emission locations leading to sulfur and nitrogen deposition at Rocky Mountain National Park and other model/study plots (including Dinosaur National Monument). Three gas-phase species (NH_3, HNO_3, and SO_2) and three particle-phase species (NH^{4+}, NO^{3-}, and SO_4^{-2}) were compared, along with total reduced nitrogen ($N^{(-III)} = NH^3 + NH^{4+}$), oxidized nitrogen ($N^{(V)} = HNO^3 + NO_3^-$), and total sulfur species ($S = SO_4^{-2} + SO_2$). Seasonal means and performance statistics were computed for the modeled and measured concentrations for each species at each of the sites and for each study period.

Air models typically underestimated ammonia and nitrates, where the observed values were approximately two times larger than for those modeled in the springtime period. To a smaller degree, however, sulfates and oxidized nitrogen were on the opposite end of this spectrum. Nitric acid was observed in much lower concentrations as compared to those found in the modeled estimates listed in the RoMANS Study, Volume 2, Table 5.38, p. 5-193 (NPS 2010).

In the RoMANS Study, precipitation chemistry shows a pH of 6.2 in springtime at Dinosaur National Monument, with relatively high concentrations of ammonia, chlorine, nitrates, and sulfates (concentrations among the top two or three of all twelve sites monitored). Nitrogen deposition dominated ammonium deposition in the Dinosaur National Monument region. Springtime concentrations of nitrates were highest in this region and decreased to the east of Dinosaur National Monument until reaching Rocky Mountain National Park and the Front Range. In Dinosaur National Monument, it was noted that aerosols are an important contributor to deposition in early springtime when air quality can be worsened at times due to inversions, which cap pollution and increase the particulate matter in a stable atmosphere.

The RoMANS Study also concluded that the rate of nitrogen species deposition in Rocky Mountain National Park has changed over the last 20 years, with inorganic nitrate increasing by 10 to 50 percent and wet deposition of ammonium increasing by 50 to 90 percent. On the other hand, sulfur wet deposition has decreased by about 20 to 60 percent. The RoMANS Study stated that the rate of nitrogen deposition in Rocky Mountain National Park is currently about 50 percent greater than what is acceptable.

3.3 GEOLOGY AND MINERALS

3.3.1 Stratigraphy

Gravel and sandy pediment slopes, sandy washes, bluffs, cliffs, ledges, and ridges of sandstone characterize the surface exposures in much of the MBPA. In some places, alluvial deposits of sand, gravel, and rounded cobbles cover these surface exposures, particularly on benches and mesa tops.

Rocks exposed in the MBPA consist of the Eocene and Oligocene Uinta Formation, the Eocene Green River Formation, and unconsolidated Quaternary alluvial and colluvial deposits (see **Figures 3.3.1-1** and **3.3.1-2 – Attachment 1**). The Utah Geological Survey (UGS) identifies the Uinta Formation as covering much of the MBPA, ranging from approximately 300 to 900 feet in thickness at the ground surface. The Uinta Formation represents river and lake deposits and contains abundant vertebrate fossils. This Formation may be further divided into members or lithostratigraphic units next in rank below a formation; the UGS has mapped two Uinta Formation members in the MBPA. The B member (also referred to as the Wagonhound member and map unit Tub) is composed of light gray, light greenish gray, light brown, and light purple mudstone and claystone with interbedded greenish gray, yellow, and brown fine grained sandstone with minor conglomerate and tuffs (Sprinkel 2007). The Lower member of the Uinta Formation (map unit Tul) is similarly composed of light-gray calcareous mudstone interspersed with light-brown to brown sandstone that creates a banded appearance (Weiss et al. 2003).

The sandstone and limestone stratigraphic unit of the Green River Formation (map unit Tgsl) is exposed in the canyon bottoms of Wells Draw in the southwestern portion of the MBPA. This stratigraphic unit is a transitional unit between the Uinta Formation and the Saline facies of the Green River Formation. The rocks from this unit consist of beds of light-brown to brown, fine-grained sandstone, siltstone and shale interspersed irregularly with white to light-gray marlstone to create a banded appearance.

Quaternary unconsolidated deposits in the MBPA occur as floodplain and river channel alluvium (map unit Qal), colluvium (map unit Qc), mixed alluvium and colluvium (map unit Qac), undivided piedmont and basin alluvium (map units Qa and Qop), and alluvial fan deposits (Qaf). Floodplain and channel alluvium occurs along the channels of Pariette Draw, Castle Peak Draw, Petes Draw, Wells Draw, and several unnamed tributaries to Pariette Draw. This alluvium is up to 100-feet thick and consists of unconsolidated sand, silt, clay, and gravel.

Colluvium (Qc) consists of a heterogeneous mixture of boulders, gravel, cobbles, sand, and silt located on hill slopes. These deposits are up to 100 feet thick and locally grade into talus, landslide deposits, and other alluvial deposits. The mixed alluvium and colluvium (Qac) consists of unconsolidated mud, silt, sand, and gravel deposited along ephemeral stream channels and in areas of low topographic relief. The undivided alluvium (labeled as Qa in the eastern portion of the MBPA and Qop in the western portion) consists of variably consolidated, poorly to moderately sorted sand, gravel, cobbles, and boulders that are deposited on nearly flat bedrock surfaces. These deposits cover large areas on Eightmile Flat and Pariette Bench but are less than 6-feet thick.

Deeper rock formations that may contain hydrocarbons are present within the MBPA underlying the surficial bedrock, and do not outcrop at the surface (see stratigraphic column in **Figure 3.3.1-2 – Attachment 1**). The formations are the targets of the deep drilling for the proposed project. The Eocene Wasatch Formation (map unit Tw) ranges from 800 to 2,000 feet thick and is a red, yellow, and light gray friable sandstone, siltstone, claystone, and conglomerate that intertongues with the overlying Douglas

Creek and underlying Flagstaff members of the Green River Formation (Sprinkle 2007). The Cretaceous Mesaverde Group (map units Kmvu and Kmvl) is between 2,500 feet to 3,400 feet in thickness and contains layers of light gray, fine grained, and cross-bedded sandstone with carbonaceous shale and coal beds. Underlying the Mesaverde Group, the Mancos shale (map unit Kms) is a dark gray, soft, slope forming calcareous shale that contains beds of siltstone and bentonitic clay ranging from 4,500 to 5,550 feet in thickness. The undivided Frontier Sandstone, Mowry Shale, and Dakota sandstone formations (map unit Kfd) range from 250- to 775-feet thick and are light brown to yellow shales and sandstones that contain petrified wood, fossils, and coal beds (Sprinkel 2007).

3.3.2 Structure

Structural characteristics of the Uinta Basin occurred during the early Eocene Laramide Orogeny, a time of mountain building in the western United States (Clark 1957). The Uinta Basin is a simple asymmetric syncline and is not highly deformed. The structural axis of the basin generally trends west to northwest and plunges gently to the northwest. The Duchesne River follows a course parallel to and 10 miles south of the structural axis. Bedrock on the southeast and southwest flanks of the basin dips about 1 to 15 degrees to the northeast and north. The northern flank of the basin dips about 10 to 35 degrees toward the southwest and is bounded by faults in many places.

Within the central portion of the basin, the dominant structural trend is east to west, possibly showing a relationship to the Uinta Mountains (Blackett 1996). The Duchesne fault system, a regional fault system, trends east to west and roughly along the northern boundary of the MBPA and parallels the trend of the Uinta Mountains to the north (Bryant 1992 and Sprinkel 2007). In some areas of the Uinta Basin, mainly to the east and north of the MBPA, vertical fractures in the Uinta Formation are filled with the solid, brittle hydrocarbon Gilsonite.

The MBPA lies to the south of the structural axis in the southwest portion of the basin. Within the MBPA, bedrock dips approximately one to three degrees to the northeast toward the central portion of the basin. There is no evidence of folding in rocks at the surface.

3.3.3 Geologic Hazards

Seismic activity is common throughout Utah and is associated with the horizontal extension of the earth's crust in the Basin and Range Province (USSC 2008). More than 36,000 earthquakes have occurred in Utah since 1962, and 16 earthquakes greater than magnitude 5.5 have occurred since 1850. Although most earthquakes in Utah are associated with the Wasatch Fault and Intermountain seismic belt in central Utah, a 4.5 magnitude earthquake occurred in 1977 in the Uinta Basin, causing minor damage (UGS 1997, USSC 2008). Oil and gas production as well as coal mining have induced earthquakes as large as magnitude 4.9. According to the 1991 Uniform Building Code (UBC) seismic zone map, the MBPA is located within Seismic Zone 1 which indicates low potential earthquake damage to structures.

Additional potential geologic hazards within the MBPA include landslides, debris flows, and rock falls. Landslides result when slopes fail under the influence of gravity. These features may be shallow or deep-seated and can occur rapidly or over a period of days or weeks. Debris flows involve the movement of rocks, soil, and other debris by water and are geologically rapid events that occur instantaneously or over a period of a few hours. Rock falls occur when basal support is removed from beneath a slope, such as when a stream undercuts the base of a rocky slope. According to the UGS, landslide susceptibility within the MBPA is classified as low to very low (Giraud and Shaw 2007). In addition, the UGS determined during an analysis of landslide maps in 2010 that landsliding was not identified within the MBPA (Elliott and Harty 2010a and 2010b).

Debris flows consist of colluvial material and water that are mobilized during large precipitation events and usually occur at the mouths of narrow side canyons. These debris flows represent the dominant method of mass wasting in the MBPA. The recurrence interval of the debris flow events is unknown. Some of the debris flows in the MBPA now support mature vegetation, while other debris flow events appear to have occurred more recently.

Steep slopes, classified as those greater than 35 percent, are present within a small portion of the MBPA along the sides of the canyons in portions of Wells Draw and Gilsonite Draw.

3.3.4 Energy and Mineral Resources

The Uinta Basin is a source area for several energy-producing minerals. These include oil and gas, coal, oil shale, bituminous sandstone and limestone ("tar sands"), and Gilsonite. In addition, known deposits of course sand and gravel as well as minor deposits of uranium, base metals, phosphate rock, and gypsum occur within the Uinta Basin.

3.3.4.1 Oil and Natural Gas

The Uinta Basin is currently one of the most active oil and natural gas producing areas in the onshore U.S. More than half of the total oil and natural gas wells drilled in Utah between 1911 and 2000 were drilled within the Uinta Basin. The UDOGM recognizes productive oil and natural gas fields within the MBPA including Monument Butte, Castle Peak, Eightmile Flat, and Pariette Bench fields (Utah AGRC 2013). Oil and natural gas fields of the Uinta Basin are depicted in **Figure 3.3.4.1-1 (Attachment 1)**.

Most of the historic energy production from the Uinta Basin is from the Tertiary Wasatch and Green River formations, and the distribution of the energy minerals is directly related to their depositional environment. The reservoir rocks in the Wasatch Formation consist of lake margin fluvial and alluvial plain sediments deposited by the Eocene Lake Uinta. This formation contains many buried stream channels that trend in a north-northwest direction and contain significant accumulations of natural gas.

The reservoir rocks of the Mesaverde Group are deltaic sandstone deposits. Gas production problems are possible within the Mesaverde Group and Wasatch Formation due to the tight and thoroughly cemented sandstone beds that reduce the porosity and permeability of the reservoir (BLM 2003a). Deeper formations that have been reported to contain oil and gas accumulations include the Cretaceous Frontier/Dakota Formation and Mancos Shale, as well as the Jurassic Morrison, Entrada, and Wingate formations (Keighin et al. 1975, White River Resources Corporation 2004).

Newfield has estimated that some 5,400 Mmbo reserves are currently present within the Uinta Basin (Newfield 2012). In addition, the USGS estimates up to 21.4 Tcf of undiscovered gas resources are present in the Uinta-Piceance Basin (USGS DDS-69-B 2002).

Within the Uinta Basin, over 15,700 oil and gas wells have been drilled as of 2011 (BLM 2012c). The 9,036 wells that are currently productive are comprised of 5,565 gas wells and 3,471 oil wells. Approximately 2,575 wells within the Uinta Basin have been plugged and abandoned.

Cumulatively, the oil and gas fields within the MBPA have produced nearly 58 Mmbo and 177 Bcf of natural gas as of March 2013 (UDOGM 2013b). A list of cumulative oil and natural gas production by field is presented in **Table 3.3.4.1-2**.

Table 3.3.4.1-2. Cumulative Oil and Natural Gas Production by Field

Production Field	Cumulative Oil Production (bbls[a])	Cumulative Natural Gas Production (Mcf[b])
Castle Peak	63,996	169,286
Monument Butte	56,167,232	127,739,094
Eightmile Flat	524,115	6,702,197
Pariette Bench	1,209,106	42,185,586
Total Production	**57,964,449**	**176,796,163**

[a] barrels
[b] thousand cubic feet

3.3.4.2 Gilsonite

In addition to oil and gas reserves, the Uinta Basin also contains deposits of Gilsonite. Gilsonite, also known as asphaltum, uintaite, or uintahite, is composed of black, brittle hydrocarbon resins that resemble tar or asphalt. Gilsonite has been used in high-grade varnishes, lacquers, paints, acid proofing, insulating plastics, inks, and mastic (BLM 2002a). The deposits occur in vertical to near vertical, long, thin, northwest trending veins that occur primarily in the Green River, Uinta, and lower Duchesne River Formations. The oil shale beds of the Green River Formation are the hydrocarbon source for these Gilsonite veins. The veins are about 0.5- to 7-miles long and vary in width from a few inches to about 18 feet (BLM 1984). Gilsonite veins are abundant in the thickest sandstone units located in the lower Uinta Formation, which were deposited during the late Eocene waning of Lake Uinta (BLM 2002a). These deposits are mostly located to the east of the MBPA and are mined primarily by shaft, stoping, and open pit methods (Cashion 1973).

Known Gilsonite veins are present within the MBPA on Eightmile Flat and Castle Peak Bench. Sprinkel (2007) has mapped a series of four veins about 1 mile long on Eightmile Flat. These veins are located in Sections 10, 17, 20, 21, 23, and 24 of Township 9 South, Range 18 East. Two veins totaling about 2.5 miles long are present on Castle Peak Bench, which is located in Township 8 South, Range 17 East and Township 9 South, Range 17 East (Bryant 1992). Gilsonite vein locations are presented above in **Figure 3.3.4.1-1 (Attachment 1)**.

3.3.4.3 Tar Sands

Tar sands are generally described as sedimentary rock or loosely cemented sedimentary deposits that function as a reservoir containing heavy hydrocarbon residues. These residues include bitumen, a class of solid and semi-solid hydrocarbons that are fusible and soluble in carbon bisulfide and exhibit chemical characteristics similar to petroleum. Bitumen is thought to be derived from crude oil that accumulated in conventional petroleum reservoirs near the land surface that were later breached, which allow the volatile components of the crude oil to escape (Blackett 1996). Other heavy hydrocarbon residues that may be present in the sedimentary reservoir include tar and degraded oils that have lost their volatile components. In the case of loose unconsolidated sands, the bitumen fills the pore spaces to form cement (Pruitt 1961). Other porous rocks such as fractured carbonates may also contain bitumen and therefore, may be classified as tar sand.

Deposits of tar sands are located throughout the Uinta Basin (Blackett 1996) and are thought to exceed 8 billion bbls of oil (Ritzma 1979). Pursuant to the Combined Hydrocarbon Leasing Act of 1981, Congress divided select tar sand deposits in the Uinta Basin into seven Special Tar Sand Areas (STSAs). The Pariette STSA is located within the and is present on Pariette Bench, which is located in Township 8 South, Range 16 East; Township 8 South, Range 17 East; Township 9 South, Range 17 East; and Township 8 South. Range 18 East. The STSAs are illustrated in **Figure 3.3.4.1-2 (Attachment 1)**. Other limited areas with lesser quality tar sand deposits are also located throughout the Uinta Basin (Blackett 1996).

The Pariette deposit consists of numerous scattered outcrops of bitumen-saturated sandstone units of the Uinta Formation that extend approximately 20 miles intermittently along Pariette Bench in proximity to the known Gilsonite veins. Ritzma (1979) estimated that the Pariette deposit contains approximately 12 to 15 million bbls of bitumen that vary from weak to rich in saturation, with some dry occurrences.

3.3.4.4 Oil Shale

Oil shale is a compact, fine grained sedimentary rock containing large quantities of organic matter that yields oil when distilled (BLM 2003a). Oil occurs as kerogen within marlstones of the Parachute Creek Member of the Green River Formation, which is present beneath the MBPA. The Mahogany Oil Shale Zone is the most notable oil shale unit of the Green River Formation, and the most likely to be mined at some point in the future. The Mahogany Zone varies in thickness throughout the Uinta Basin and generally thickens towards the south (USGS DDS-69-BB 2010).

Pursuant to the Combined Hydrocarbon Leasing Act of 1981, Congress designated certain areas within the Uinta Basin that were known to contain deposits of oil shale as Known Oil Shale Leasing Areas (KOSLAs). These areas have a minimum oil shale yield of 25 gallons per ton, a minimum Mahogany Zone thickness of 25 feet, and a maximum depth of 3,000 feet below the ground surface. KOSLAs are present within the Eightmile Flat portion of the MBPA, which is located in Township 9 South, Range 17 East; Township 9 South, Range 18 East; and Township 9 South, Range 19 East. The KOSLAs are represented in **Figure 3.3.4.1-2 (Attachment 1)** (BLM 2002a).

3.3.4.5 Other Leasable, Locatable, and Salable Minerals

Known deposits of course sand and gravel occur throughout the MBPA in association with alluvial deposits from the Green River, Wells Draw, and Castle Peak Draw (BLM 2002a). Small quantities of sand and gravel are mined along the Green River from several ephemeral washes and from a series of gravel pits located in the western portion of the MBPA. A formerly active pit authorized as a "Free Use Permit" to the BLM is found in the northwest portion of the MBPA, which is located in Section 25, Township 8 South, Range 16 East and Section 30, Township 8 South, Range 17 East (BLM 2002a). The Free Use Permit for this pit expired in 2010; however, the pit has not been closed and reclaimed. In addition, Duchesne County has processed 43 applications for new gravel pits on private lands or minerals between 2008 and 2012 (PDEIS Comment #28 submitted by Mike Hyde, Community Development Administrator for Duchesne County, on August 27, 2013).

Minor deposits of uranium, base metals (copper), phosphate rock, and gypsum also occur within the Uinta Basin. Base metals, gypsum, and phosphate rock occur in small deposits near the Uinta Mountains to the north of the MBPA. Some uranium exists within the carbonaceous units of the Mesaverde Group and Uinta Formation underlying the MBPA (BLM 2002a). However, with the exception of the existing phosphate mining activities in Uintah County, little interest or development potential exists for any of these materials in the Uinta Basin (BLM 1984).

3.4 PALEONTOLOGICAL RESOURCES

Paleontological resources, or fossils, are the remains, imprints, or traces of once-living organisms preserved in rocks and sediments. These include mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains. The fossil record is the only evidence that life on earth has existed for more than 3.6 billion years. Fossils are considered nonrenewable resources because the organisms they represent no longer exist. Thus, once destroyed, a fossil can never be replaced.

Fossils on federal lands are protected under provisions of FLPMA, as amended, 43 USC 1737(b), Public Law 94-579; the Omnibus Public Land Management Act of 2009, Subsection D, Section 6302, Public Law 111-011; and subsequent federal regulations in 43 CFR 3802 and 3809. Paleontological resources on State of Utah lands are afforded protections under provisions of Chapter 73 of the Utah State Code.

3.4.1 Regional Overview

The study area for paleontological resources is the MBPA. Sediments that today comprise the Uinta Mountains were first deposited between 1,000 and 600 million years ago. During that time, more than 25,000 feet of shallow water, sandstone, and shale accumulated from westward-flowing stream deposits. The basin filled and major deposition halted, although some thickening of the sedimentary deposits continued (BLM 2012b, p. 3-46). These deposits were then uplifted during the Laramide Orogeny, a time of mountain building associated with the latest Cretaceous period and Paleocene epoch that formed the Uinta Mountains and the southerly adjacent synclinal Uinta Basin (Rasmussen et al. 1999 in BLM 2012b, p. 3-46). These stratified sedimentary deposits have been subsequently classified as the Uinta, Duchesne River, and Green River Formations. For a more detailed discussion of the geology within the MBPA, refer to **Sections 3.3.1** and **3.3.2**.

The Uinta Basin defines a region that is well known for its geologic history and paleontological importance. The region preserves a discontinuous but richly diversified fossil record spanning at least 535 million years from the Cambrian period to the Pleistocene epoch. The Uinta, Duchesne River and Green River Formations and their fossils are important not only for their taxonomic diversity, but also because they document the Paleocene climatic change. During this period, the conditions changed from a tropical and subtropical climate during the deposition of the Green River Formation to a more arid and cooler savannah climate during the deposition of the Uinta Formation (BLM 2005a, p 3.3-1). Fossils mammals from the Uinta Formation are used to define the Uintan Land Mammal Age. More than 100 species of animals, birds, turtles, and other reptiles, amphibians, and fishes are known from this formation. The Uinta Formation consists of two distinct member levels: the upper Myton member and the lower Wagonhound member (Winterfeld 2011). Due to very limited exposures within the MBPA, the Green River Formation has produced plant and invertebrate remains (i.e., plants, invertebrates, fishes, turtles, crocodiles, bird bones, mammal bones, and teeth and mammal tracks) that are considered of major importance. The Duchesne Formation does not occur within the MBPA.

3.4.2 Resource Assessment Guidelines

Paleontological resource classification is a ranking of areas and geologic units according to their potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. These rankings are used in land use planning, as well as for identifying areas that may warrant special management and/or special designations. Using published geologic maps (Bryant 1992, Rowley et al. 1985) and the results of literature searches, the Area of Potential Effect (APE) for this EIS was classified using the Potential Fossil Yield Classification (PFYC) system for paleontological resources, per BLM Instruction Memorandum (IM) No. 2008-009 (BLM 2007b). The PFYC system that categorizes paleontological resources by class is discussed below.

The PFYC system classifies geologic units on the basis of relative abundance of vertebrate fossils or uncommon invertebrate or plant fossils, and the sensitivity to adverse impacts. A higher class number indicates a higher potential for fossils. The classification should be applied at the geologic formation or member level. The system provides baseline guidance to assess and mitigate impacts to paleontological resources. The classification should be an intermediate step in the analysis and should be used to assess additional mitigation needs (BLM 2012b).

The classes present in the MBPA are described below.

Class 2: Low potential for fossils such as alluvial deposits.

Class 3: Moderate or unknown potential for fossil content that varies in significance.

Class 4: High potential for occurrence of fossils.

Class 5: Very high potential for highly fossiliferous geologic units that consistently and predictably produce vertebrate or important invertebrate or plant fossils.

3.4.3 Resource Assessment Overview

Using the PFYC System, the paleontologic sensitivity of the five primary geologic formations within the MBPA are provided in **Table 3.4.3-1**. The alluvial and colluvial deposits of the Holocene age are too young to contain fossils. Thus, the remaining four units, the river terrace and older pediment deposits of the Pleistocene age and the Uinta and Green River Formations of the Eocene age, have the potential to contain scientifically important fossils.

Table 3.4.3-1. Summarized Paleontological Sensitivities of Geologic Units in the MBPA Using the PFYC System

Geologic Unit	Age	Typical Fossils	PFYC
Quaternary alluvium and colluvium	Holocene	None	Class 2
River terrace deposits	Pleistocene	Vertebrates[1]	Class 3
Older pediment deposits	Pleistocene	Vertebrates[1]	Class 3
Uinta Formation	Eocene	Vertebrates, invertebrates	Class 5
Green River Formation	Eocene	Invertebrates, invertebrates, plants	Class 5

[1] Few records of fossil localities of Pleistocene age are known within the MBPA.

The USGS has 557 fossil localities on file for the four core USGS quadrangles within the MBPA: Myton SW, Myton SE, Pariette Draw SW, and Uteland Butte. The large number of known localities demonstrates the paleontological importance of the MBPA. Current data reveals fossils are found primarily in badland topography, that is, exposures of eroded and incised mudstone and small sandstone units primarily involving the Uinta and Green River Formations. Conversely, relatively un-dissected areas within the MBPA are unlikely to yield fossils because of alluvium cover.

3.5 SOILS

Detailed soil mapping was conducted by the USDA Natural Resources Conservation Service (NRCS). The Soil Survey of Uintah Area, Utah – Parts of Daggett, Grand, and Uintah Counties (Uintah Survey) is the primary source of information regarding soils within the MBPA (NRCS 2003). Detailed mapping has not been completed for that portion of the MBPA that is located within Duchesne County; however, Price Utah NRCS has conducted draft soil mapping, which is available for this area (NRCS 2012a). The Uintah and Duchesne County soil survey data have been supplemented by additional information available on the NRCS Web Soil Survey and Official Soil Series Descriptions databases (NRCS 2012b and 2012c).

The development of soils is governed by many factors, including climatic conditions (e.g., the amount and timing of precipitation, temperature, and wind), the parent material that the soil is derived from, topographic position (e.g., slope, elevation, and aspect), geomorphic processes, and vegetation type and cover. Soils within the MBPA developed on structural benches, ridges, hills, alluvial fans, erosional remnants, floodplains, strath terraces, and alluvial flats. Soil textures include sandy loam, gravelly sandy loam, clay loam, cobbly loam, silty clay loam, channery loam, and variations of these types. Rock outcrop is also common.

Figure 3.5-1 (Attachment 1) shows the soil map units within the MBPA. Each detailed soil map unit consists of one or more general soil series that occur in association with each other. **Table 3.5-1** lists the soil map units that are present within the MBPA. These map units cover areas as small as 14 acres to as large as 17,550 acres. **Appendix C** summarizes the soil textures, parent materials, landforms, slopes, depth class, drainage and runoff classification, and other factors of the soil map units within the MBPA that are relevant to potential management concerns.

Table 3.5-1. Soil Map Units within the MBPA

Soil Map Unit	Acres[1]	Percent MBPA
Badland-Rock outcrop complex, 1 to 100 percent slopes	1,177	1.0
Boreham loam, 0 to 2 percent slopes	3,583	3.0
Braf-Rock outcrop-Uffens complex, 5 to 50 percent slopes	11,174	9.3
Cadrina-Casmos-Rock outcrop complex, 2 to 40 percent slopes	8,138	6.8
Cadrina extremely stony loam-Rock outcrop complex, 25 to 50 percent slopes	23	0.0
Cakehill sandy loam, 2 to 5 percent slopes	1,824	1.5
Cheeta-Rock outcrop complex, 30 to 80 percent slopes	871	0.7
Green River Loam, 0 to 2 percent slopes, occasionally flooded	14	0.0
Ioka-Cadrina complex, 2 to 25 percent slopes	1,441	1.2
Ioka gravelly sandy loam, 0 to 3 percent slopes	263	0.2
Ioka very gravelly sandy loam, 4 to 25 percent slopes	1,928	1.6
Jenrid-Green River complex, 0 to 2 percent slopes	554	0.5
Jenrid sandy loam, 0 to 2 percent slopes	2,355	2.0
Kilroy loam, 1 to 4 percent slopes	8,381	7.0
Leebench sandy loam, 0 to 2 percent slopes	2,572	2.1
Leeko loam, 0 to 4 percent slopes	1,417	1.2
Mikim loam, 2 to 5 percent slopes	980	0.8
Mikim silt loam, 2 to 4 percent slopes	24	0.0
Motto-Muff-Rock outcrop complex, 2 to 25 percent slopes	1,988	1.7
Motto-Rock outcrop complex, 2 to 25 percent slopes	17,175	14.3
Motto-Uffens complex, 2 to 25 percent slopes	997	0.8
Muff gravelly sandy loam, 2 to 8 percent slopes	4,201	3.5
Nakoy loamy fine sand, 1 to 5 percent slopes	1,485	1.2
Pariette gravelly sandy loam, 2 to 8 percent slopes	4,262	3.6
Pherson-Hickerson complex, 1 to 8 percent slopes	302	0.3
Rock outcrop	67	0.1
Shotnick sandy loam, 2 to 4 percent slopes	320	0.3
Smithpond-Montwel-Badland association, 3 to 25 percent slopes	2,574	2.1
Uffens-Rock outcrop complex, 15 to 25 percent slopes, eroded	1,665	1.4
Uffens loam, 3 to 8 percent slopes	7,395	6.2

Soil Map Unit	Acres[1]	Percent MBPA
Uffens sandy loam, 0 to 2 percent slopes	1,857	1.6
Umbo silty clay loam, 0 to 2 percent slopes	1,288	1.1
Walknolls-Rock outcrop complex, 2 to 50 percent slopes	3,271	2.7
Walknolls-Uendal association, 2 to 25 percent slopes	17,550	14.7
Walknolls extremely channery sandy loam, 4 to 25 percent slopes	3,749	3.1
Water	177	0.1
Undocumented	2,703	2.3
Totals	**119,743**	**100.0**

[1] Total acreage estimates are based on GIS-software calculations and may not equal total acreage by soil map unit due to rounding, removal of overlapping development, and minute boundary discrepancies. GIS-based calculations are considered more accurate than estimates calculated using simple addition and, therefore, will be used throughout this document.

3.5.1 Soil Characteristics of Greatest Management Concern

For evaluation of potential environmental impacts to soils, several physical, chemical, and interpretive soil characteristics were evaluated within the MBPA. These soil characteristics include water erosion potential, wind erodibility, available water supply, rooting depth, sodium adsorption ratio (SAR), restoration potential, and the presence of biological soil crusts (BSCs).

3.5.1.1 Water Erosion Potential

Water erosion potential can vary widely among soil units within a given area and is dependent on the particle size distribution of the soil, the slopes on which it is found, and the amount and type of vegetative cover. The NRCS typically rates each of the soil units according to its whole soil water erosion potential (Kw). This erosion potential indicates the general susceptibility of a soil to sheet and rill erosion. The value of Kw ranges from 0.02 to 0.69. The higher the Kw value of a soil type, the more susceptible the soil type is to sheet and rill erosion. Erosion hazards become critical issues when protective vegetation is removed during and following activities such as access road and well pad construction. Typically, soils found on steeper slopes and badland areas have a higher water erosion potential than those found on gentler slopes.

The NRCS has provided whole soil water erosion potentials for 87 percent of the MBPA (NRCS 2012b and 2012c). Approximately 67,073 acres (56 percent) of the soils within the MBPA have erosion potentials of 0.15 or less, which indicate low to moderate water erosion potential in these areas. Approximately 36,886 acres (31 percent) of the soils within the MBPA are rated between 0.20 and 0.55, indicating a moderate to high water erosion potential. The remaining 15,786 acres (13 percent) of the MBPA have not been rated for whole soil water erosion potential. This portion of the MBPA includes rock outcrop (map unit 193), Uffens-Rock outcrop complex, 15 to 25 percent slopes (map unit CZE2), Braf-Rock outcrop-Uffens complex, 5 to 50 percent (map unit EZF2), undocumented soils, and open water (map unit 258).

3.5.1.2 Wind Erodibility

In addition to erosion by water, soils are also susceptible to erosion by wind. Wind erosion is closely correlated with the soil texture of the surface layer, the size and durability of surface clods, the proportion of rock fragments, and the presence of organic material. Soils with more fines are at greater risk of wind erosion, and soils with more gravel and/or stones have a lower risk of wind erosion. In addition, soil moisture and the presence of frozen soil layers also affect a soil's susceptibility to wind erosion. The NRCS estimates wind erodibility with an index of tons per acre per year that could be lost to wind erosion (NRCS 2012c).

The NRCS has provided wind erodibility indices for 98 percent of the MBPA (NRCS 2012b and 2012c). Approximately 24,816 acres (21 percent) of the soils within the MBPA have a wind erodibility index of 0 tons per acre per year. Approximately 92,049 acres (77 percent) of the soils within the MBPA have a wind erodibility index between 48 and 134 tons per acre per year, with an average of 77 tons per acre per year. The remaining 2,880 acres (2 percent) of the MBPA have not been rated for wind erodibility. These unrated acreages include undocumented soils and open water.

3.5.1.3 Available Water Capacity

Available water capacity is the total volume of water in a soil that is available for use by plants. This parameter is commonly estimated as the amount of water held between field capacity and the wilting point, and is measured in inches. Plants need a soil water capacity value greater than 4 inches to sustain root viability between rainfall events or periods of irrigation, and buffer the plants root environment against periods of water deficit. Available water capacity values less than 4 inches results in stressed plants and higher erosion potential. Soil properties that reduce the available water capacity are a high proportion of rock fragments, low organic matter content, high bulk density, and sandy soil textures (NRCS 1998).

The NRCS has provided available water capacity values for 84 percent of the MBPA (NRCS 2012b and 2012c). Approximately 64,185 acres (54 percent) of the soils within the MBPA have available water capacity values greater than 4 inches. Approximately 35,349 acres (30 percent) of the soils within the MBPA have available water capacity values less than 4 inches. The remaining 20,211 acres (16 percent) of the MBPA have not been rated for available water capacity. This portion of the MBPA contains Smithpond-Montwel-Badland association, 3 to 25 percent slopes (map unit 142), Rock outcrop (map unit 193), Uffens-Rock outcrop complex, 15 to 25 percent slopes (map unit CZE2), Braf-Rock outcrop-Uffens complex, 5 to 50 percent slopes (map unit EZF2), Mikim loam, 2 to 5 percent slopes (map unit MaB), Cheeta-Rock outcrop complex, 30 to 80 percent slopes (map unit RAL), undocumented soils, and open water.

3.5.1.4 Rooting Depth

The rooting depth of a soil may be determined by identifying the depth of the nearest restrictive soil layer. In the case of rooting depth, a restrictive layer is a nearly continuous layer that has one or more physical, chemical, or thermal properties that greatly impede the movement of water and air through the soil, restrict roots, or otherwise provide an unfavorable root environment. Examples include bedrock, cemented layers, dense layers, and frozen layers (NRCS 2012c).

The NRCS has provided depths to the nearest restrictive soil layer for 98 percent of the MBPA (NRCS 2012b and 2012c). Approximately 50,197 acres (42 percent) of the soils within the MBPA have restrictive layers greater than 200 inches below the ground surface. Approximately 66,668 acres (56 percent) of the soils within the MBPA have restrictive layers between 0 to 16 inches below the ground surface. The remaining 2,880 acres (2 percent) of the MBPA have not been assigned depths to the nearest restrictive layers. These unrated acreages include undocumented soils and open water.

3.5.1.5 Sodium Adsorption Ratio

SAR is a measure of the amount of sodium relative to calcium and magnesium in soil water. Soils with SAR values greater than 13 are considered sodic and may be characterized by an increased dispersion of organic matter and clay particles, reduced saturated hydraulic conductivity and aeration, and a general degradation of soil structure (NRCS 2012c).

The NRCS has provided SARs for 98 percent of the (NRCS 2012b and 2012c). Approximately 77,439 acres (65 percent) of the soils with the MBPA have SARs less than 13. Approximately 39,426 acres (33 percent) of soils within the MBPA have SARs greater than 13 and are considered sodic. The remaining 2,880 acres (2 percent) of the MBPA have not been rated for SARs. These unrated acreages include undocumented soils and open water.

3.5.1.6 Restoration Potential

Restoration potential rates a soil for its ability to recover from degradation by restoring functional and structural integrity after disturbance. This factor is dependent on the soil structure, pH conditions, adequate precipitation for recovery, and soil salinity, among other factors. Excessive salinity (salt content) or sodicity (sodium content) can inhibit the growth of desirable vegetation and therefore, successful restoration.

A “high potential” rating indicates that the soil has features that are very favorable for recovery, and good performance can be expected. A “moderate potential” rating indicates that the soil has features that are generally favorable for recovery and fair performance can be expected. A “low potential” rating indicates that the soil has one or more features that are unfavorable for recovery, and poor performance can be expected (NRCS 2012c).

The NRCS has provided restoration potential ratings for 86 percent of the MBPA (NRCS 2012b and 2012c). Approximately 99,228 acres (83 percent) of the soils within the MBPA are rated low for restoration potential. Approximately 3,554 acres (3 percent) of the soils within the MBPA are rated moderate for restoration potential. The remaining 16,963 acres (14 percent) of the MBPA were not rated for restoration potential. This portion of the MBPA includes Badland-Rock outcrop complex, 1 to 100 percent slopes (map unit 12), Rock outcrop (map unit 193), Uffens-Rock outcrop complex, 15 to 25 percent slopes (map unit CZE2), Braf-Rock outcrop-Uffens complex, 5 to 50 percent slopes (map unit EZF2), undocumented soils, and open water.

3.5.1.7 Biological Soil Crusts

BSCs occur within the MBPA on the surface of mostly undisturbed soils that support the dominant salt-desert shrubland, sagebrush shrubland, grassland, and to a lesser extent, pinyon-juniper woodland vegetation types. BSCs are composed of various organisms including bacteria, green algae, lichens, mosses, and micro-fungi that symbiotically form a rough carpet on the surface and a soil-binding matrix below (Belnap et al. 2001). On the Colorado Plateau (in which the MBPA is located) the predominant cyanobacterial-lichen soil crust often provide up to 10 percent of the living cover (Belnap and Gardner

1993). As a group, BSCs are adaptable to a full range of soil types, which include shallow to deep, heavy to light textures, moist to drier conditions, and slopes ranging from level to steep. Given this adaptability, soil crusts are expected to occur across much of the MBPA. Steeper slopes supporting mostly unstable soils and those areas lacking soil cover, such as badlands and rock outcrops, generally do not support BSCs. BSCs typically occupy interspaces of open ground between higher vascular plants or below their canopies (Belnap and Gardner 1993).

In semi-arid and arid environments, BSC cover fixes carbon and nitrogen for other plants, reduces surface reflection, raises soil temperature, increases water infiltration rates, and stabilizes soils by reducing water and wind erosion (Belnap et al. 2001). Nitrogen fixation improves soil fertility by increasing availability of nitrogen fertility in typically nutrient-poor systems such as the semi-arid landscapes within the MBPA (Muscha and Hild 2006; Belnap and Garner 1993). Because soils with developed BSCs generally are dark in color, they absorb more of the sun's energy as heat, which can positively increase microbial activity, increase plant nutrient uptake, promote higher plant seed germination of native vascular plants adapted to BSCs, and increase seedling growth rates. The roughened surface produced by the raised expression of the BSCs can act as detention structures for water and affect increased water infiltration to the benefit of both BSCs and higher plants in the cool deserts of the Colorado Plateau (Belnap et al. 2001). Cyanobacterial-lichen BSCs of the Colorado Plateau entrap and bind soil particles together. This process increases the size of soil aggregates, which in turn, increases their resistance to the erosive forces of wind and water (Belnap et al. 2001; Belnap and Gardner 1993).

Threats to BSCs generally arise from damage or loss of BSCs due to disturbance including fire, drought, invasive and non-native plant infestations, livestock trampling, human foot traffic, motorized vehicle passage, and blading or excavation of the soil surface and BSCs as part of construction activities (Belnap et al. 2001). The rate of natural recovery of BSCs in disturbed areas is dependent on the type and severity of disturbance and the availability of BSCs to recolonize the affected areas.

3.6 WATER RESOURCES

3.6.1 Regional Overview

The MBPA lies within an arid to semi-arid region in the Uinta Basin of northeastern Utah. The North Slope of the Uinta Basin is drained by the Green River, which flows along the southeastern corner of the MBPA.

3.6.2 Surface Water Resources

The MBPA lies largely within the Lower Green–Desolation Canyon basin (although a small amount of the Upper South Myton Bench-Duchesne River basin also lies in the northeastern corner of the MBPA). The region in and around the MBPA is mostly drained by intermittent/ephemeral streams. However, Pariette Draw and the Green River are considered the major perennial streams draining most ???? the MBPA.

3.6.2.1 MBPA Drainages

The MBPA is located within threesubbasins of the Desolation Canyon basin (Upper Pariette Draw, Lower Pariette Draw, and Sheep Wash–Green River subbasins) and one subbasin of the Lower Green–Duchesne basin (Antelope Creek subbasin). **Figure 3.6.2.1-1 (Attachment 1)** depicts the drainage basins within the MBPA. **Table 3.6.2.1-1** provides a summary of the area of each subbasin within the MBPA.

Table 3.6.2.1-1. Subbasin Drainages Within the MBPA

Subbasin Name	Drainage Area in MBPA (acres)	Percentage of MBPA	Total Drainage Area (acres)
Upper Pariette Draw	40,805	34.1	10,0548
Lower Pariette Draw	68,163	56.9	12,1147
Sheep Wash–Green River	10,624	8.9	13,5941
Antelope Creek	151	0.1	10,7919
Total	**119,743**	**100.0**	**46,5555**

3.6.2.2 Other Water Resources

The Lower Duchesne River Wetlands Mitigation Project lies approximately 2 miles north of the MBPA and is approximately 4,800 acres in size. The Sand Wash Recreation Area lies approximately 9 miles south of the MBPA.

3.6.2.1.1 Upper Pariette Draw Subbasin

The Upper Pariette Draw subbasin includes the drainage configuration of Gilsonite Draw to Wells Draw to Pleasant Valley Wash to Pariette Draw to the confluence with Castle Peak Draw (see **Figure 3.6.2.1-1 – Attachment 1**). The headwaters of Gilsonite Draw are located south and west of the southwestern portion of the MPBA. Gilsonite Draw flows northward to its confluence with Wells Draw just north of the MBPA boundary. The headwaters of Wells Draw are located in the Bad Land Cliffs and Wells Draw Road areas east of the Gilsonite Draw headwaters, at an elevation of about 7,000 feet amsl. Wells Draw flows northward for approximately 16 miles to its confluence with Pleasant Valley Wash, which eventually intersects with Pariette Draw. Castle Peak Draw joins Pariette Draw near the northeastern MBPA boundary. The lower segments of Wells Draw show evidence of deep channel incision, unstable banks, and a lack of riparian vegetation development.

3.6.2.1.2 Lower Pariette Draw Subbasin

This subbasin includes the drainage configuration of Big Wash to Castle Peak Draw to Pariette Draw. Castle Peak Draw is an intermittently flowing drainage with a wide and sinuous channel. Very little riparian vegetation grows in the floodplain, except along the lower 2 miles of the channel just above the confluence with Pariette Draw.

The Pariette Wetlands, an important man-made wetland created to support waterfowl in an otherwise arid region, are supported by surface water diversions from Pariette Draw. Several large reservoirs upstream catch spring runoff and provide a steady year-round flow to support agriculture and the created wetlands. A canal also diverts water from the Duchesne River to support flow in Pariette Draw. Flow is diverted from Pariette Draw to 25 man-made ponds to support waterfowl habitat.

Characteristics of the wetlands vegetation cover type are described in **Section 3.7.1.3**. Recreational amenities associated with the Pariette Wetlands ACEC are discussed in **Section 3.13.2.5**. Additional information about the Pariette Wetlands ACEC can be found in **Section 3.15.1**.

3.6.2.1.3 Sheep Wash-Green River Subbasin

This subbasin includes Sheep Wash and Petes Wash (which drains into Sheep Wash in the northeastern portion of the MBPA), as well as Desert Spring Wash, Four Mile Wash, and Sand Wash (which all drain directly to the Green River). The Green River is the main river to which all water drains in this subbasin; that is, all water from each of the other subbasins eventually drains to the Green River. Each of the washes in this subbasin is intermittently flowing, and no gauging data are available.

3.6.2.1.4 Antelope Creek Subbasin

While a portion of the Antelope Creek subbasin lies within the MBPA boundary, the total acreage is very small (approximately 20 acres). No development is proposed in this subbasin. Therefore, the Antelope Creek subbasin is not be discussed further.

3.6.2.2 Surface Water Occurrence

There are approximately 5 miles of perennial streams (Pariette Draw) and approximately 1,040 miles of intermittent stream in the MBPA, as identified by USGS 1:24,000 scale topographic maps. However, most of the intermittent streams shown on USGS maps in the MBPA do not flow regularly or for a portion of each year and therefore, are more accurately to be considered ephemeral streams or washes. The Green River, the largest river in the Uinta Basin, abuts the extreme southeastern corner of the MBPA. Average annual flow in the Green River is about 4,064,290 acre-feet at Ouray, Utah (BLM 2006a). **Figure 3.6.2.1-1 (Attachment 1)** depicts that Pariette Draw feeds into the northeastern part of the MBPA and is fed by ephemeral and intermittent streams that originate within the MBPA boundary.

3.6.2.3 Surface Water Quality

Water quality use designations for the State of Utah have been established for all waters of the state, which includes some of the perennial and intermittent/ephemeral streams in the MBPA (UDEQ 2002). According to the UDEQ, designations for streams with established beneficial uses specific to the MBPA include the following:

- 1C–Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water.
- 2A-Protected for frequent primary contact recreation where there is a high likelihood of ingestion of water or a high degree of bodily contact with the water. Examples include, but are not limited to, swimming, rafting, kayaking, diving, and water skiing.
- 2B–Protected for infrequent primary contact recreation. Waters with this designation also are protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing.
- 3B–Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.
- 3D–Protected for waterfowl, shore birds, and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.
- 4–Protected for agricultural uses, including irrigation of crops and stock watering.

The Utah Division of Water Quality (UDWQ) has completed beneficial use assessments for the Green River and Pariette Draw (UDEQ 2004a). **Table 3.6.2.3-1** lists the use designations that have been assigned to perennial and intermittent/ephemeral streams in the MBPA.

Table 3.6.2.3-1. Beneficial Use Designations for Streams in the MBPA

Use Designations	Stream
1C, 2A, 3B, 4	Green River
2B, 3B, 3D, 4	Pariette Draw and tributaries from confluence with Green River to headwaters

3.6.2.3.1 Surface Water Quality Standards

The UDWQ has established water quality standards that are contained in Utah Administrative Code, Rule R317-2. These standards were enacted to protect the waters of Utah and to improve the quality for each designated beneficial use. **Table 3.6.2.3.1-1** lists water quality standards that are pertinent to the MBPA.

Table 3.6.2.3.1-1. Water Quality Standards for Beneficial Uses Pertinent to thethe MBPA

Domestic Water Uses		**Recreation Uses**		**Aquatic Wildlife Uses**	**Agricultural Uses**	
Parameter	**1C**	**2A**	**2B**	**3B**	**3D**	**4**
Physical						
pH (range)	6.5–9.0	6.5–9.0	6.5–9.0	6.5–9.0	6.5–9.0	6.5–9.0
Turbidity Increase (NTU)	--	10	10	10	15	--
Temperature (ºC)	--	--	--	27	--	--
Max Temperature Change (ºC)	--	--	--	4	--	--
Dissolved Oxygen 2	--	--	--	--	--	--
30-day average	--	--	--	--	--	--
7-day average	--	--	--	--	--	--
1-day minimum	--	--	--	--	--	--
Total dissolved gases	--	--	--	--	--	--
Metals (dissolved, maximum mg/L)3						
Arsenic	0.01	--	--	--	--	0.1
Barium	1	--	--	--	--	--
Beryllium	<0.004	--	--	--	--	--
Cadmium	0.01	--	--	--	--	0.01
Chromium	0.05	--	--	--	--	0.1
Copper	--		--	--	--	0.2

Domestic Water Uses		**Recreation Uses**		**Aquatic Wildlife Uses**	**Agricultural Uses**	
Lead	0.015	--	--	--	--	0.1
Mercury	0.002	--	--	--	--	--
Selenium	0.05	--	--	--	--	0.5
Silver	0.05	--	--	--	--	--
Metals (dissolved, maximum µg/L)3,4						
Aluminum5	--	--	--	87/750	87/750	--
Arsenic (trivalent)	--	--	--	150/340	150/340	--
Cadmium	--	--	--	0.25/2	0.25/2	--
Chromium (hexavalent)	--	--	--	11/16	11/16	--

3.6.2.3.2 Impairments

Pursuant to Section 303(d) of the CWA as amended, the State of Utah is required to identify the assessment unites (AUs) for which existing pollution controls are not stringent enough to implement state water quality standards. An AU is considered water quality limited when it is known that its water quality does not meet applicable water quality standards or is not expected to meet to applicable water quality standards. Impaired streams in the MBPA were identified by the UDEQ and are shown in **Table 3.6.2.3.2-1** (UDEQ 2010) and **Figure 3.6.2.3-1** depicts the impaired streams.

The State of Utah has determined that all segments of the Green River in the Uinta Basin are supporting designated beneficial uses. Pariette Draw was assessed as impaired for agricultural activities (use designation 4) due to boron and total dissolved solids (TDS). Pariette Draw was also assessed as impaired for warm water species of game fish and other warm water aquatic life (use designation 3B) due to selenium (UDEQ 2010). Due to these exceedances, Pariette Draw is listed on Utah's 2010 303(d) list of impaired waters and is described in greater detail in the following paragraphs. **Table 3.6.2.3.2-1** summarizes the water quality data available for Pariette Draw. Section 303(d) of the CWA and EPA's Water Quality Planning and Management Regulations (40 CFR 130) require states to develop total maximum daily loads (TMDLs) of pollutants for water bodies that are not meeting applicable water quality standards. TMDLs list the maximum amount of a pollutant that a water body can assimilate and still meet water quality standards. Impaired streams in the MBPA were identified by the UDEQ and are shown in **Table 3.6.2.3.2-1** (UDEQ 2010) and **Figure 3.6.2.3-1** depicts the impaired streams

Table 3.6.2.3.2-1. Summary of TMDL Load Reductions in Pariette Draw (STORET Site 4933480) Required for Surface Waters Downstream of the Proposed Project

Pollutant of Concern	TDS	Boron	Selenium
Current load	174.77b tons/day	137.98b tons/day	0.23b lbs/day
Loading capacity	59.85b tons/day	64.68b tons/day	0.17b lbs/day
TMDL load reduction	114.91b tons/day	73.30b tons/day	0.07b lbs/day
Percentage reduction	65.8%	53.1%	28.1%

Source Note: 2010. UDEQ-DWQ. TMDLs for Total Dissolved Solids, Selenium, and Boron in Pariette Draw.
[a] Load over the 10%–40% flow percentile range.

Table 3.6.2.3.2-2. Impaired Streams

Assessment Unit ID	Assessment Unit Name	Cause	Use	Source
UT14060005-002_00	Pariette Draw Creek	Boron, Selenium, and TDS	Agricultural, Warm Water Aquatic Life, and Wildlife Habitat	Agriculture, Habitat Modification (other than hydromodification), Natural Sources, Irrigated Crop Production, and Livesock

As water flows over and through soil particles and rock, soluble materials accumulate in the water. Major ions commonly found in water are sodium, calcium, magnesium, potassium, chloride, sulfate, and bicarbonate. In addition to ions, there are other dissolved substances in water such as dissolved organic materials. The sum of all of the dissolved substances in water is TDS and is measured in mg/L. Selenium is both an essential micronutrient and potentially detrimental element in high concentrations. Selenium has been shown to cause mortality, deformity, and reproductive failure in fish and aquatic birds (EPA 1998a). Boron is a naturally occurring trace element that is essential for the growth of crop plants as well as some algae, fungi, and bacteria, but can be toxic in excess amounts.

Accordingthe for mg/L for Pariette Draw????, TDS, boron, and selenium in the area are derived primarily from natural sources. In addition to natural pathways, irrigation management has resulted in artificial transport pathways of these constituents to surface waters. The USGS, Bureau of Reclamation, and BLM developed a modeling tool called SPARROW (Spatially-Referenced Regression On Watershed attributes), which was used to interpret water quality data for dissolved-solids specific to surface waters in the Upper Colorado River Basin (UCRB) (Kenney et al. 2009). The MBPA is within the UCRB. The SPARROWSPARROW model relates measured chemical constituents at monitoring stations to upland catchment attributes, such as land use, land cover, or geology. The model is a statistical assessment based on an existing transport model and available water-quality monitoring data for the UCRBUCRB. Of the 22 factors that were considered in the model, the largest factors influencing TDS concentrations in surface waters in the UCRB are:

- **Bedrock geology.** Bedrock geology, particularly sedimentary rock formed from marine sediments, is the largest natural source of dissolved solids to streams in the UCRB (Iorns et al. 1965; Liebermann et al. 1989; U.S. Department of the Interior 2003; Anning et al. 2007; Kenney et al. 2009). Due to its chemical composition, exposure, and erodibility, the Uinta Formation is a natural source of soluble salts. The Uinta Formation is a continental formation and was formed in lacustrine to fluvial environments. Some of the lake sediments in the formation are highly saline as the area was a terminal lake without an outlet.

- **Climate characteristics.** Precipitation is the major land-to-water transport mechanism associated with natural sources of dissolved solids. Evaporative transpiration is another mechanism that can enhance the transport of dissolved solids to streams. Evaporative transpiration is the process of transferring water to the atmosphere through evaporation of water and transpiration from plants. Vegetation consumes water containing dissolved solids from within the soil zone and transpires pure water, leaving behind the dissolved minerals. Evaporation on bare soils also removes pure water and precipitates minerals on the soil surface, which are immediately available for dissolution through precipitation and surface runoff.

- **Irrigated agriculture.** Irrigation water and natural precipitation (in excess of soil holding capacity and plant requirements) percolates through the soils and transports these constituents into the shallow alluvial aquifer (groundwater) where they eventually return to the streams as base flow. Deposition of salts on the ground surface also seals the soil pores that prevent percolation and increase the volume and velocity of runoff, which leads to sheet flows and increased pollutant loading. Irrigation of agricultural lands, particularly those derived from sedimentary rocks, is the major anthropogenic source of dissolved solids in the UCRB, which accounts for approximately 40 percent of the dissolved-solids load (Iorns et al. 1965, Liebermann et al. 1989, Kenney et al. 2009). Irrigation return flows are a potential source of salinity because they dissolve and transport soil particles and salts from fields and return them to surface waters through surface and subsurface flows.

The primary natural source of boron in the area is bedrock that was formed from evaporated swamps and marshes. The Uinta Basin was once covered by Uinta Lake, which eventually evaporated to marshlands before finally disappearing. Shallow groundwater transport is an important transport pathway of boron in the area (Naftz et al. 2008). Boron concentrations in groundwater are derived from leaching of rocks and soils that contain borate and borosilicate minerals. The highest boron concentrations in Pariette Draw occur from November through March, which suggests two conclusions: 1) groundwater contributions are responsible for most of the boron impairment; and 2) stormwater runoff generally dilutes the concentrations in surface waters.

As noted in Utah's 2010 303(d) list, the primary sources of selenium in Pariette Draw are natural sources and irrigated crops. Transport of eroded soil from the Pariette Draw drainage area (some of which has naturally high concentrations of selenium) is also an important pollutant source. The primary natural source of selenium in the area is found in black shale-derived soils and landscapes. Black shale comprises organic-rich, fine-grained sedimentary rock deposited in very low oxygen conditions. Dry conditions make irrigation necessary for nearly all crops grown in the drainage area. Normal aqueous chemical processes that have been enhanced by seepage from irrigated agriculture are capable of transporting some of the naturally occurring selenium in the sediments to the stream system. Seeps in the area provide another pathway for selenium to move from groundwater to surface water.

Two USGS studies on TDS do not identify surface erosion as an important transport pathway of TDS to surface waters in the UCRB (Kenney et al. 2009). These studies also report that surface disturbance, including disturbance related to oil and gas development, does not have a statistically significant impact to TDS concentrations in surface waters in the area. Likewise, neither surface disturbance nor oil and gas development was noted in the Pariette Draw TMDL as important factors in selenium or boron transport or surface water concentrations. The possible exception to this would be disturbance on heavily irrigated lands that have higher than normal soil concentrations of selenium or boron. The Pariette Draw TMDL states "though oil and gas well pads are prevalent in the watershed, they are not considered a major source based on observations of BMPs employed during site visits in the field."

Sediment loading, salinity, and the trace element selenium are the most substantial water quality concerns in the MBPA. Current sediment loading/year to the Green River is approximately 9,684,000 tons at Jensen, Utah (BLM 2005b). No data is available on sediment loading to other perennial and intermittent waterways in or near the MBPA.

Between July 2, 2009, and August 8, 2012, the USGS collected 11 water samples from a stream gauge on the Green River at Ouray, Utah (Stream Gauge 09272400) (USGS 2012a). The TDS concentration varied from 171 mg/L to 413 mg/L with an average concentration of 341 mg/L. The average flow in the Green River at the same gauge varied from 3,814 cfs in 2010 to 7,172 cfs in 2011 with an average flow of 5,493 cfs. Salt load is a function of flow and concentration. Therefore, an estimate for the average TDS load in the Green River at the confluence of Pariette Draw was derived by multiplying the average TDS concentration by the average flow of 5,041 tons/day of TDS. As previously mentioned, the average TDS load from Pariette Draw is about 175 tons/day, so Pariette Draw increases the TDS load in the Green River by approximately 3 percent.

The selenium concentration in the Green River at Stream Gauge 09272400 varied from 0.39 µg/L to 0.88 µg/L with an average concentration of 0.71 µg/L. Assuming an average flow in the Green River of 5,493 cfs, the average selenium load in the Green River near the MBPA would be 21.0 lbs/day. As previously mentioned, the average selenium load from Pariette Draw is about 0.23 lbs/day; therefore, Pariette Draw increases the selenium load in the Green River by about 1 percent.

3.6.3 Groundwater Resources

Groundwater occurs and is conveyed in underground aquifers that may consist of unconsolidated or consolidated materials. Unconsolidated alluvial aquifers are usually unconfined and generally found in the shallowest or most recent geologic formations. Consolidated aquifers, which tend to be found in older geologic formations, are generally unconfined near outcrops and confined at greater depth beneath the ground surface. Multiple aquifers may underlie any given location on the land surface. These aquifers not only may have distinct characteristics of geochemistry and hydraulic potential, but also may be recharged in different locations and flow in different directions.

3.6.3.1 Occurrence of Groundwater Resources

An estimated 31 million acre-feet of groundwater (computed without regard for water quality) is stored in the upper 100 feet of saturated material in aquifers of the Uinta Basin (UDWaR 1999). The majority of this groundwater is in consolidated or bedrock aquifers. The principal aquifers associated with the MBPA are (from shallowest to deepest) the Uinta-Animas aquifer, the Mesaverde aquifer, and the Dakota-Glen Canyon aquifer system. Unconsolidated aquifers are less widespread in the Uinta Basin. They occur mostly in the Duchesne-Myton-Pleasant Valley area, which lies outside the MBPA (UDWaR 1999). Within the MBPA, the formations comprising the Uinta-Animas aquifer extend from the ground surface to approximately 5,000 to 7,000 feet bgs. Water bearing units in the Uinta-Animas aquifer commonly are separated from each other and from the underlying Mesaverde aquifer by units of low permeability claystone, shale, marlstone, or limestone. The formations comprising the Mesaverde aquifer extend to a depth of approximately 10,000 to 15,000 feet bgs. They are underlain by the Mancos shale, which acts as a confining unit for lower aquifers and a potential barrier to vertical groundwater flow and movement (USGS 1995). The Dakota-Glen Canyon aquifer is found at depths greater than 15,000 feet bgs in the MBPA. The Utah Geological Survey in a recent publication showed numerous Underground sources of Drinking Water (USDWs) at depth (Anderson, Paul B., Vanden Berg, Michael, and Stephanie Carney, 2012).

3.6.3.2 Recharge/Discharge of Aquifers

According to the UDWaR (1999), recharge to the consolidated bedrock aquifers occurs in a variety of ways, including:

- Infiltration of precipitation directly into the fractured bedrock outcrops or into the aquifer from overlying, saturated, unconsolidated deposits.
- Upward leakage of groundwater from underlying formations.
- Downward leakage of groundwater from overlying formations.
- Seepage into the aquifers from streams flowing across outcrops, where the water table is lower than the streambed.
- Inflow of groundwater that originates outside the basin but flows into the basin.

Basin-wide, the total annual estimated recharge to consolidated bedrock aquifers is 630,000 acre-feet divided between infiltration of precipitation (600,000 acre-feet/year), infiltration of irrigation water (20,000 acre-feet/year), and return flow from wells and springs (10,000 acre-feet/year). Subsurface inflow in the Uinta Basin is estimated to be negligible. It has been observed that approximately 80 percent of the total aquifer recharge occurs in the northern half of the Uinta Basin. This occurs because greater amounts of water (particularly in the form of precipitation) are available to enhance aquifer recharge in the Uinta Mountains as compared to the water available in the much lower and more arid upland areas at the southern edge of the basin.

According to the UDWaR (1999), discharge of groundwater from the consolidated bedrock aquifers occurs during the following scenarios:

- Springs and seeps, including seepage into streambeds.
- Water wells.
- Evaporative transpiration.
- Upward leakage into the overlying formations.
- Downward leakage into underlying formations.
- Small subsurface flows into neighboring basins.

The total annual estimated discharge of 630,000 acre-feet is divided among evapotranspiration in vegetated areas (246,000 acre-feet/year), seepage to streams and discharge to springs (combined 363,000 acre-feet/year), and withdrawal from wells and springs (21,000 acre-feet/year). The location of the four springs is shown on **Figure 3.6.3.2-1 (Attachment 1)** (Utah SGID ArcSDE Database, 2011). Subsurface outflow in the Uinta Basin is estimated to be negligible.

3.6.3.3 Groundwater Quality

In the Uinta Basin, dissolved-solids concentrations in water in the Uinta-Animas aquifer generally range from 500 to 3,000 milligrams per liter (mg/L); however, concentrations can exceed 10,000 mg/L in some of the deeper parts of the Uinta Formation. Water that is defined as “usable” has less than or equal to 10,000 mg/L total dissolved solids. Federal Safe Drinking Water Act regulations define a USDW as an aquifer or portion thereof: (a)(1) which supplies any public water system; or (2) which contains a sufficient quantity of ground water to supply a public water system; and (i) currently supplies drinking water for human consumption; or (ii) contains fewer than 10,000 mg/L total dissolved solids; and (b) which is not an exempted aquifer (See 40 CFR Section 144.3). Smaller dissolved-solids concentrations are prevalent near recharge areas where the water usually is a calcium or magnesium bicarbonate type. Larger dissolved-solids concentrations are more common near discharge areas where the water generally is a sodium bicarbonate or sulfate type (USGS 1995).

Groundwater quality in the Mesaverde aquifer is highly variable. In many of the basin-margin areas, the dissolved-solids concentrations in water are fewer than 1,000 mg/L; however, local concentrations can exceed 35,000 mg/L. Relatively fresh water tends to occur in areas of the aquifer that are recharged by infiltration from precipitation or surface water sources (USGS 1995).

In the Glen Canyon aquifer, dissolved-solids concentrations in water tend to be less than 1,000 mg/L, where the aquifer is less than 2,000 feet below the land surface. However, where the aquifer is deeply buried, the concentration of dissolved solids can exceed 35,000 mg/L (USGS 1995).

Vander Berg et. al (2013) show that the Birds Nest Aquifer located beneath the northeastern portion of the MBPA has very high saline concentrations. This aquifer has an average thickness of about 84 feet and is at a depth between 1,500 and 2,000 feet bgs. Some areas exceed 10,000 mg/L and may be used as a disposal area for saline water. Recent studies have identified that the saline zone for the Bird's Nest Aquifer within the MBPA ranges from 57 to 1,509 feet bgs, while areas nearest the MBPA have a saline zone within the Bird's Nest Aquifer that is 1,400 to 1,500 feet bgs (Vanden Berg et al. 2013). Existing studies suggest that groundwater within the MBPA starts to become saline at relatively shallow depths of less than 500 feet bgs (Holmes et al. 1987). Available data suggest that both the Mesaverde and Dakota-Glen Canyon aquifers are likely to be saline beneath the MBPA (UDNR 1987). The potential for smaller fresh water lenses within these formations exists, but in general, these lenses would be considered too deep for domestic or stock use. The potential for the presence of usable non-saline groundwater occurs primarily within the Uinta-Animas aquifer formations.

There are numerous small surface water diversions and point-to-point diversions (stream segment from which stock may drink) within the MBPA, mainly for stock watering. The Utah Division of Water Rights identifies only five water supply wells within the proposed MBPA, which are shown in **Table 3.6.3.3-1**. These wells are also depicted on **Figure 3.6.3.2-1 (Attachment 1)**.

Table 3.6.3.3-1. Known Groundwater Users in the MBPA

Water Right Number and Type	Name of Water Right Holder	Cadastral Location	Water Uses	Depth (feet)	Water Quality Data Available?
Well (47-1820)	Gasco Production Company	T9S, R18E, Section 29	Domestic, oil production	200–300	Yes
Well (47-1805)	Inland Production Company	T8S, R17E, Section 21	Unknown	4,990	No
Well (47-1346)	Louis Clark Roberts	T8S, R17E, Section 21	Unknown	Unknown	No
Well (47-1501)	Clark and Arva Abegglen	T8S, R17E, Section 21	Irrigation, Stock, Domestic	Unknown	No
Well (47-1330)	USA Bureau of Land Management	T9S, R17E, Section 4	Unknown	Unknown	No

Table 3.6.3.3-2 summarizes groundwater quality data that was obtained for the only known well. The limited water quality data available in the MBPA shows saline groundwater at depths of 200 to 300 feet bgs. The Gasco production well, which draws water from a depth of 200 to 300 feet bgs, has a TDS value of 4,187 mg/L, which is considered brine.

Table 3.6.3.3-2. Available Water Quality Data for the MBPA

Constituent	Units	GascoProduction Well (47-1820) (4/29/2011)	Meet or Exceed Primary or Secondary Drinking Water Standard?
Total dissolved solids	mg/L	4,187	Exceeds
pH	pH Units	8.1	Meets
Conductivity	uS/cm	6,344	N/A
Temperature	F	80	N/A
Calcium	mg/L	4.3	N/A
Magnesium	mg/L	1.5	N/A
Barium	mg/L	0.13	N/A
Sodium	mg/L	1,393	N/A
Iron	mg/L	0.15	Meets
Manganese	mg/L	0.03	Meets
Bicarbonate	mg/L	976	N/A
Sulfate	mg/L	807	Exceeds
Chloride	mg/L	1,000	Exceeds

Constituent	Units	GascoProduction Well (47-1820) (4/29/2011)	Meet or Exceed Primary or Secondary Drinking Water Standard?
Hydrogen Sulfide (gas)	mg/L	5.0	N/A

3.7 VEGETATION

3.7.1 General Vegetation

The MBPA is located within the Intermountain Semi-desert region of the Colorado Plateau floristic province. This region mixes an array of geographic substrates, topographic features, climatic regimes, soil types, and other physical factors to produce a mosaic of floristic components and associated natural habitats. The plant communities encountered in the MBPA consist of typical Intermountain Basins Shrubland associations. These communities are often mixed, transitional, or widely distributed.

The vegetation communities within the MBPA are mapped and described using data and descriptions from the Southwest Regional Gap Analysis Project (SWReGAP) vegetation maps (Lowry et al. 2007) according to methodologies and nomenclature adopted by the U.S. National Vegetation Classification System (FGDC 1997). Data on wetlands were supplemented with interpretation of aerial photographs (USGS 2011) and information from USFWS National Wetlands Inventory (NWI) maps (USFWS 2012a). In this effort, a total of 17 vegetation communities are recognized and mapped within the MBPA, as depicted in **Figure 3.7.1-1 (Attachment 1)**. These 17 vegetation types were grouped into five general land cover types, including Scrub/Shrub, Grassland/Herbaceous, Wetlands, Barren Lands, and Altered/Disturbed Lands. **Table 3.7.1-1** summarizes acreage of vegetation communities within the MBPA by land cover type.

Table 3.7.1-1. Vegetation Communities within the MBPA

Land Cover Type	Vegetation Community	Acres within the MBPA[1]	Percent of the MBPA
Scrub/Shrub	Colorado Plateau Pinyon-Juniper Woodland and Shrubland	6,195	5.2
	Colorado Plateau Mixed Low Sagebrush Shrubland	23,968	20.0
	Intermountain Basins Big Sagebrush Shrubland	7,011	5.9
	Intermountain Basins Mat Saltbush Shrubland	662	0.6
	Intermountain Basins Mixed Salt Desert Scrub	43,713	36.5
Total		**81,551**	**68.1**
Grassland/ Herbaceous	Intermountain Basins Semi-Desert Grassland	3,025	2.5
	Intermountain Basins Semi-Desert Shrub Steppe	8,526	7.1
Total		**11,551**	**9.6**
Wetlands	Intermountain Basins Greasewood Flat	7,232	6.0
	Rocky Mountain Lower Montane Riparian Woodland and Shrubland	460	0.4
	North American Arid West Emergent Marsh	450	0.4

Land Cover Type	Vegetation Community	Acres within the MBPA[1]	Percent of the MBPA
	Lacustrine and Riverine Deepwater Habitats	461	0.4
Total		**8,604**	**7.2**
Barren Lands	Intermountain Basins Shale Badland	1,502	1.3
	Colorado Plateau Mixed Bedrock Canyon and Tableland	4,835	4.0
Total		**6,337**	**5.3**
Altered/ Disturbed Lands	Invasive Annual Grassland	4,008	3.3
	Invasive Southwest Riparian Woodland and Shrubland	191	0.2
	Agricultural Lands	2,079	1.7
	Existing Development (i.e., roads, well pads, or other surface facilities)	5,403	4.5
Total		**11,682**	**9.8**
Grand Total		**119,743**	**100**

[1]Total acreage estimates are based on GIS-software calculations and may not equal total acreage by soil map unit due to rounding, removal of overlapping development, and minute boundary discrepancies. GIS-based calculations are considered more accurate than estimates calculated using simple addition and therefore, will be used throughout this document.

3.7.1.1 Scrub/Shrub

The Scrub/Shrub land cover type covers approximately 81,551 acres within the MBPA. Five vegetation communities are represented in this group: Colorado Plateau Pinyon-Juniper Woodland and Shrubland; Colorado Plateau Mixed Low Sagebrush Shrubland; Intermountain Basins Big Sagebrush Shrubland; Intermountain Basins Mat Saltbrush Shrubland; and Intermountain Basins Mixed Salt Desert Scrub. The five crub/shrub vegetation types that occur in the MBPA are described briefly below.

3.7.1.1.1 Colorado Plateau Pinyon-Juniper Woodland and Shrubland

This vegetation cover type occurs in dry mountains and foothills of the Colorado Plateau region from the Western Slope of Colorado to the Wasatch Range. It is typically found at lower elevations ranging from 5,000 to 8,000 feet amsl. The vegetation is dominated by dwarfed (usually less than 10 feet tall) two-needle pinyon (*Pinus edulis*) and/or Utah juniper (*Juniperus osteosperma*) trees that form extensive tall shrublands. These trees occur in a mosaic with taller (usually greater than 10 feet tall), more dense woodland associations of two-needle pinyon and/or Utah juniper. These stands may be solely dominated by Utah juniper (*Juniperus osteosperma*) or may be co-dominated by other *Juniperus* species. Other shrubs that may occur in this vegetation community may include black sagebrush (*Artemisia nova*), Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*), or yellow rabbitbrush (*Chrysothamnus viscidiflorus*). This vegetation cover type covers approximately 6,195 acres within the MBPA.

3.7.1.1.2 Colorado Plateau Mixed Low Sagebrush Shrubland

Located in the Colorado Plateau, Tavaputs Plateau, and Uinta Basin, this vegetation cover type occurs in canyons, gravelly draws, hilltops, and dry flats at elevations generally below 6,000 feet amsl. Soils are often rocky, shallow, and alkaline. It includes open shrublands and steppe dominated by black sagebrush, Bigelow sagebrush (*Artemisia bigeloviin*), or sometimes Wyoming big sagebrush. The Colorado Plateau Mixed Low Sagebrush Shrubland type covers approximately 23,968 acres within the MBPA.

3.7.1.1.3 Intermountain Basins Big Sagebrush Shrubland

Found in broad basins between mountain ranges, plains, and foothills, this vegetation cover type occurs throughout much of the western U.S., at elevations between 5,000 and 7,500 feet amsl. Soils are typically deep, well drained, and non-saline. These shrublands are dominated by Basin big sagebrush (*Artemisia tridentata ssp. tridentata*) and/or Wyoming big sagebrush. Scattered juniper (*Juniperus* spp.), greasewood (*Sarcobatus vermiculatus*) and saltbush (*Atriplex* spp.) may be present in some stands.

Rubber rabbitbrush (*Ericameria nauseosa*), yellow rabbitbrush, antelope bitterbrush (*Purshia tridentata*), or mountain snowberry (*Symphoricarpos oreophilus*) may co-dominate altered/disturbed stands. The Intermountain Basins Big Sagebrush Shrubland type covers about 7,011 acres within the MBPA.

3.7.1.1.4 Intermountain Basins Mat Saltbush Shrubland

This vegetation cover type occurs on gentle slopes and rolling plains in the northern Colorado Plateau and Uinta Basin. Substrates are shallow, typically saline, alkaline, fine-textured soils. These landscapes that typically support dwarf shrublands are composed of relatively pure stands of saltbush such as mat saltbush (*Atriplex corrugate*) or Gardner's saltbush (*Atriplex gardneri*). Other dominant or co-dominant dwarf-shrubs may include longleaf wormwood (*Artemisia longifolia*), birdfoot sagebrush (*Artemisia pedatifida*), or bud sagebrush (*Picrothamnus desertorum*), sometimes mixed with other low shrubs like winterfat (*Krascheninnikovia lanata*) or shortspine horsebrush (*Tetradymia spinosa*). The Intermountain Basins Mat Saltbush Shrubland type covers approximately 662 acres within the MBPA.

3.7.1.1.5 Intermountain Basins Mixed Salt Desert Scrub

This widespread shrub-steppe system is dominated by perennial grasses and forbs and occurs throughout much of the northern Great Basin and Wyoming. Soils are typically deep and nonsaline, often with a microphytic crust. Shrubs may increase following heavy grazing and/or fire suppression activities. The vegetation is characterized by a typically open to moderately dense shrubland that are comprised of one or more saltbush species such as shadscale saltbush (*Atriplex confertifolia*), fourwing saltbush (*Atriplex canescens*), or cattle saltbush (*Atriplex polycarpa*). Other shrubs that may be present to co-dominant include Wyoming big sagebrush, yellow rabbitbrush, rubber rabbitbrush, Mormon tea (*Ephedra nevadensis*), spiny hopsage (*Grayia spinosa*), winterfat, bud sagebrush, or shortspine horsebrush. These shrublands and steppe habitats are the most prevalent vegetation community in the MBPA, covering approximately 43,713 acres of the MBPA.

3.7.1.2 Grassland/Herbaceous

The Grassland/Herbaceous land cover type covers approximately 11,551 acres within the MBPA and includes two vegetation cover types: Intermountain Basins Semi-Desert Grassland and Intermountain Basins Semi-Desert Shrub Steppe. These vegetation types are described below.

3.7.1.2.1 Intermountain Basins Semi-Desert Grassland

This vegetation cover type occurs throughout the intermountain western U.S. on dry plains and mesas at elevations between 4,750 and 7,600 feet amsl. These grasslands occur in lowland and upland areas and may occupy swales, playas, mesa tops, plateau parks, alluvial flats, and plains, but sites are typically xeric. The dominant perennial bunch grasses and shrubs within this system are all very drought-resistant. Grasslands are typically dominated or codominated by Indian ricegrass (*Achnatherum hymenoides*), threeawn (*Aristida*) spp., blue grama (*Bouteloua gracilis*), needle-and-thread grass (*Hesperostipa comate*), Torrey's muhly (*Muhlenbergia torreyana*), or James' galleta (*Pleuraphis jamesii*). In addition, this vegetation type may include scattered shrubs and dwarf-shrubs of species of sagebrush, saltbush, and snakeweed. The Intermountain Basins Semi-Desert Grassland type covers approximately 3,025 acres within the MBPA.

3.7.1.2.2 Intermountain Basins Semi-Desert Shrub Steppe

This vegetation cover type includes open-canopied shrublands of typically saline basins, alluvial slopes, and plains across the intermountain western U.S. Substrates are often saline and calcareous, medium- to fine-textured, alkaline soils, but they can include some coarser-textured soils. The vegetation is characterized by a typically open to moderately dense shrubland composed of one or more saltbush species, with a sparse to moderately dense herbaceous layer dominated by perennial grasses.

Characteristic grasses include Indian ricegrass, blue grama, saltgrass (*Distichlis spicata*), needle-and-thread grass, James' galleta, Sandberg bluegrass (*Poa secunda*), and alkali sacaton (*Sporobolus airoides*).

Characteristic shrub species include fourwing saltbush, sand sagebrush (*Artemisia filifolia*), Greene's rabbitbrush (*Chrysothamnus greenei*), yellow rabbitbrush, rubber rabbitbrush, broom snakeweed (*Gutierrezia sarothrae*), and winterfat. Scattered Basin big sagebrush species may be present but does not dominate. The Intermountain Basins Semi-Desert Shrub Steppe type covers approximately 8,526 acres of the MBPA.

3.7.1.3 Wetlands

The wetlands land cover type covers approximately 8,604 acres within the MBPA and includes three (3) vegetation cover types: Intermountain Basins Greasewood Flat, Rocky Mountain Lower Montane Riparian Woodland and Shrubland, and North American Arid West Emergent Marsh. Of this total, approximately 461 acres (5.3 percent) of the wetlands are Lacustrine and Riverine Deepwater Habitats. Deepwater habitats include environments such as rivers, lakes, and reservoirs where surface water is permanent and often too deep to support emergent vegetation. While not considered a vegetation cover type *per se*, many of these areas contain plants that grow principally on or below the surface of the water and therefore, are discussed with the other three principal vegetation ccommunities below.

3.7.1.3.1 Intermountain Basins Greasewood Flat

This vegetation cover type occurs throughout much of the western U.S. in intermountain basins and extends onto the western Great Plains. It typically occurs near drainages on stream terraces and flats or may form rings around more sparsely vegetated playas. Sites typically have saline soils and a shallow water table. They may flood intermittently but remain dry for most growing seasons. This vegetation cover type usually occurs as a mosaic of multiple communities, with open to moderately dense shrublands dominated or co-dominated by greasewood, fourwing saltbush, or shadscale saltbush. Occurrences are often surrounded by mixed salt desert scrub. This woody vegetation community is the most prevalent wetland habitat, covering about 7,232 acres within the MBPA.

3.7.1.3.2 Rocky Mountain Lower Montane Riparian Woodland and Shrubland

This vegetation cover type is found in the foothills, canyon slopes, and lower mountains of the Rocky Mountains and on outcrops and canyon slopes in the western Great Plains. These shrublands occur at elevations between 5,000 and 9,500 feet amsl and are usually associated with exposed sites, rocky substrates, and dry conditions, all of which limit tree growth. Dominant trees may include boxelder (*Acer negundo*), narrowleaf cottonwood (*Populus angustifolia*), balsam poplar (*Populus balsamifera*), eastern cottonwood (*Populus deltoids*), Fremont cottonwood (*Populus fremontii*), Douglas-fir (*Pseudotsuga menziesii*), peachleaf willow (*Salix amygdaloides*), or Rocky Mountain juniper (*Juniperus scopulorum*).

Dominant shrubs include Rocky Mountain maple (*Acer glabrum*), speckled alder (*Alnus incana*), water birch (*Betula occidentalis*), red osier dogwood (*Cornus sericea*), river hawthorn (*Crataegus rivularis*), stretchberry (*Forestiera pubescens*), chokecherry (*Prunus virginiana*), skunkbush sumac (*Rhus trilobata*), park willow (*Salix monticola*), Drummond's willow (*Salix drummondiana*), narrowleaf willow (*Salix exigua*), sandbar willow (*Salix irrorata*), shining willow (*Salix lucida*), or silver buffaloberry (*Shepherdia argentea*). The Rocky Mountain Lower Montane Riparian Woodland and Shrubland type covers approximately 460 acres within the MBPA.

3.7.1.3.3 North American Arid West Emergent Marsh

This vegetation cover type occurs throughout much of the arid and semi-arid regions of western North America. Natural marshes may occur in depressions in the landscape (ponds or kettle ponds), as fringes around lakes, and along slow-flowing streams and rivers (such riparian marshes are also referred to as sloughs). Marshes are frequently or continually inundated with water at depths up to 4 feet. Water levels may be stable or may fluctuate 2 feet or more over the course of the growing season.

Marshes have distinctive soils that are typically mineral, but can also accumulate organic material. Soils have characteristics that result from long periods of anaerobic conditions in the soils. The vegetation is characterized by herbaceous plants that are adapted to saturated soil conditions. Common emergent and floating vegetation includes various species of sedges (*Scirpus* sp.), rushes (*Schoenoplectus* and *Juncus* sp.), cattails (*Typha* sp.), pondweed (*Potamogeton* sp.), smartweed (*Polygonum* sp.), and water-lily (*Nuphar sp.*). The North American Arid West Emergent Marsh type covers about 450 acres within the MBPA.

3.7.1.3.4 Lacustrine and Riverine Deepwater Habitats

This category includes all stock ponds, lakes, reservoirs, streams, rivers, or other ponded waters that are situated in topographic depressions or defined channels covering 461 acres. These habitats are characterized by persistent emergent vegetation that is sparse or lacking, but include any areas with abundant submerged or floating-leaved aquatic vegetation. Common submerged and floating vegetation includes various species of duckweed (*Lemna* sp.), pondweed, watershield (*Brasenia* sp.), watermilfoil (*Myriophyllum* sp.), hornwort (*Ceratophyllum* sp.), and waterweed (*Elodea sp.*).

3.7.1.4 Barren Lands

The Barren Lands group covers approximately 6,337 acres within the MBPA and includes two vegetation cover types: Intermountain Basins Shale Badland and Colorado Plateau Mixed Bedrock Canyon and Tableland. These two vegetation communities are described below.

3.7.1.4.1 Intermountain Basins Shale Badland

This widespread vegetation cover type of the intermountain western U.S. is composed of barren and sparsely vegetated substrates typically derived from marine shales; however, this vegetation community also includes substrates that are derived from siltstones and mudstones (clay) with a high rate of erosion and deposition. Landforms are typically rounded hills and plains that form a rolling topography. Environmental variables that lead to sparse dwarf-shrubs are harsh soil properties and the high rate of erosion and deposition. Species in this category include mat saltbush, Gardner's saltbush, birdfoot sagebrush, and herbaceous vegetation. The Intermountain Basins Shale Badland type covers approximately 1,502 acres within the MBPA.

3.7.1.4.2 Colorado Plateau Mixed Bedrock Canyon and Tableland

The distribution of this vegetation cover type is centered on the Colorado Plateau where it is composed of barren and sparsely vegetated landscapes on steep cliff faces, narrow canyons, and open tablelands of predominantly sedimentary rocks, such as sandstone, shale, and limestone. The vegetation is characterized by very open tree canopy or scattered trees and shrubs with a sparse herbaceous layer. Common varieties include two-needle pinyon, Ponderosa pine (*Pinus ponderosa*), Juniper species, littleleaf mountain mahogany (*Cercocarpus intricatus*), and other short-shrub and herbaceous species. These species have adapted to using moisture from cracks and pockets where soil accumulates as habitat. The Colorado Plateau Mixed Bedrock Canyon and Tableland type covers approximately 4,835 acres within the MBPA.

3.7.1.5 Altered/Disturbed Lands

The Altered/Disturbed Lands group covers approximately 11,682 acres within the MBPA and includes four vegetation cover types: Invasive Annual Grassland, Invasive Southwest Riparian Woodland and Shrubland, Agricultural Lands, and Existing Development. While not a vegetation cover type *per se*, the Existing Development category includes all scraped or excavated bare land that is or has been in transition to a developed state. The four categories of altered or disturbed vegetation communities that occur within the MBPA are described below.

3.7.1.5.1 Invasive Annual Grassland and Invasive Southwest Riparian Woodland and Shrubland

The Invasive Annual Grassland vegetation type covers approximately 4,008 acres within the MBPA. It is dominated by annual grass species such as cheatgrass (*Bromus tectorum*) and California brome (*Bromus carinatus*) that have been introduced to the area. The Invasive Southwest Riparian Woodland and Shrubland type covers approximately 191 acres and is dominated by tamarisk (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*).

3.7.1.5.2 Agricultural Lands

The Agricultural Lands category includes areas used for planting grasses, legumes, or grass-legume mixtures for livestock grazing; producing hay or annual crops such as corn, soybeans, vegetables; or growing perennial woody crops such as orchards and vineyards. The NRCS Utah State Office has designated certain soil map units in Duchesne and Uintah Counties as prime farmlands only if irrigated (NRCS Utah State Office 2011, 2013). Based on the NRCS 2013_9 Draft (2013) for Duchesne County and NRCS Table Y (2011) for Uintah County, soil map units (27) Boreham loam, (160) Nakoy loamy fine sand, and (206) Shotnick sandy loam are listed as prime farmland and present within the MBPA. For more details about these soil map units within the MBPA, see **Figure 3.5-1** (**Attachment 1**) and **Table 3.5-1**. The agricultural vegetation community covers about 2,079 acres within the MBPA.

3.7.1.5.3 Existing Development

The Existing Development category consists of all scraped or excavated bare land that is currently in or has previously been in transition to a developed state. This includes all lands covered by urban development, including residential, transportation, utility infrastructure, well pads, mines, quarries, and other surface features. Isolated structures such as farmsteads and low density residential areas are also included in this category. As part of the Altered/Disturbed Lands group, Existing Development covers an estimated 5,403 acres within the MBPA.

3.7.2 Invasive and Noxious Weeds

A "noxious weed" is defined as any plant the Utah Commissioner of Agriculture and Food determines to be especially injurious to public health, crops, livestock, land, or other property per the Utah Noxious Weed Act (Utah State Legislature 2007). Invasive weeds include plants that are not listed as noxious but are non-native to a particular area.

State- and County-listed noxious weeds are organized into three levels: A, B, and C. Class A weeds have a relatively low population size within the State and are given highest priority as an *Early Detection Rapid Response* weed. Class B weeds have a moderate population throughout the State and are generally thought to be controllable in most areas. Class C weeds are found extensively in the State and are thought to be beyond control. Therefore, efforts would be made towards containment of smaller infestations. **Table 3.7.2-1** summarizes those weeds designated and published as noxious for the State of Utah, per the Commissioner of Agriculture and Food, Section 4-17-3, Utah Noxious Weed Act.

The most common locations for weeds include existing disturbance areas such as roadsides, well pads, pipelines, adjacent washes, and areas where grazing has removed native species. The most problematic noxious weeds in MBPA and surrounding region are saltcedar (*Tamarix ramosissima)*, Russian Knapweed (*Centaurea virgata*) and hoary cress (*Cardaria draba)*. Although not listed on the noxious weed list, the most common invasive species in the MBPA are Russian thistle (*Salsola iberica*), halogeton (*Halogeton glomeratus*), and cheatgrass.

Table 3.7.2-1. Uintah County, Duchesne County, and State of Utah Noxious Weeds

Common Name	Scientific Name	State or County Noxious Weed List
Black Henbane	*Hyoscyamus niger*	State List Class A
Diffuse Knapweed	*Centaurea diffusa*	State List Class A
Johnson grass	*Sorghum halepense*	State List Class A
Leafy Spurge	*Euphorbia esula*	State List Class A
Medusahead	*Taeniatherum caput-medusae*	State List Class A
Oxeye Daisy	*Chrysanthemum leucanthemem*	State List Class A
Purple Loosestrife	*Lythrum salicaria*	State List Class A
Spotted Knapweed	*Centaurea maculosa*	State List Class A
St. Johnswort	*Hypericum perforatum*	State List Class A
Sulfur Cinquefoil	*Potentilla recta*	State List Class A
Yellow Star thistle	*Centaurea solstitialis*	State List Class A

Common Name	Scientific Name	State or County Noxious Weed List
Yellow Toadflax	*Linaria vulgaris*	State List Class A
Bermudagrass	*Cynodon dactylon*	State List Class B
Dalmation Toadflax	*Linaria genistifolia*	State List Class B
Dyer's Woad	*Istatis tinctoria*	State List Class B
Hoary Cress	*Cardaria draba*	State List Class B
Perennial Pepperweed	*Lepidium latifolium*	State List Class B
Poison Hemlock	*Conium maculatum*	State List Class B
Russian Knapweed	*Centaurea repens*	State List Class B
Scotch Thistle	*Onopordum acanthium*	State List Class B
Squarrose Knapweed	*Centaurea virgata*	State List Class B
Canada Thistle	*Cirsium arvense*	State List Class C
Field Bindweed	*Convolvulus arvensis*	State List Class C
Houndstongue	*Cynoglossum officiniale*	State List Class C
Quack grass	*Elytrigia repens*	State List Class C
Saltcedar	*Tamarix ramosissima*	State List Class C
Common Teasel	*Dipsacus fullonum*	Uintah County List A
Puncturevine	*Tribulus terrestris*	Uintah County List B
Russian Olive	*Elaeagnus angustifolia*	Uintah County List C
Musk Thistle	*Carduus nutans*	Duchesne County List
Water Hemlock	*Cicuta douglasii*	Duchesne County List

3.8 RANGE RESOURCES

3.8.1 Regional Overview

The BLM administers livestock grazing as a permitted use on public rangelands. The western ranching industry relies on large tracts of private, federal, and state surface lands to graze livestock on a seasonal basis. Access to forage on federal and state lands increases the total amount of forage available to livestock, which enables greater livestock production for private ranchers (McGinty et al. 2009). Historically, management of western public lands was formulated with regard to its effects on livestock grazing. However, public land management has become more complex such that considerations are being made to examine multiple uses on rangelands in greater detail. While traditional resource management (i.e., wildlife, watershed health, etc.) for the most part has been complimentary, more recently resource uses (i.e., livestock grazing, oil and gas exploration, recreation, etc.) have become largely competitive (McGinty et al. 2009). Livestock grazing on BLM-administered public lands is authorized in Section 3 of the Taylor Grazing Act of 1934; subsequent federal regulations are set forth in 43 CFR 4100.

Livestock grazing is a permitted use on State of Utah land and is administered by SITLA. Livestock grazing is authorized under the Utah Enabling Act, Articles X and XX of the Utah constitution and Sections 53C-1-302(10(a)(ii) and 53C-5-102; subsequent state grazing regulations are set forth under the Utah Administrative Code, Rule R850-50.

The BLM VFO administers grazing in the MBPA in accordance with Vernal Resource Management Plan (BLM 2008b) and the Guidelines for Grazing Management as development by the Utah BLM in 1997 (BLM 1997b). The Utah Guidelines were instituted for all Utah rangelands to meet the Standards for Rangeland Health (BLM 1997b) based on basic ecological principles that underlie sustainable production of rangeland resources. The four fundamental standards are outlined below:

- Watersheds are in, or are making significant progress toward, properly functioning physical condition. This condition includes their upland, riparian/wetland, and aquatic components. Soil and plant conditions support infiltration, soil moisture storage, and the release of water that are in balance with climate and landform, and maintain or improve water quality, water quantity, and timing and duration of flow.

- Ecological processes, including the hydrologic cycle, nutrient cycle, and energy flow are maintained, or there is significant progress toward their attainment in order to support healthy biotic populations and communities.

- Water quality complies with state water quality standards and achieves, or is making significant progress toward achieving, established BLM management objectives such as meeting wildlife needs.

- Habitats are, or are making significant progress toward being, restored or maintained for Federal threatened or endangered species, Federal proposed, Category 1 and 2 Federal candidate, and other special status species.

3.8.2 Grazing Allotments in the MBPA

The MBPA contains portions of six grazing allotments and one stock drive trail. **Figure 3.8.2-1** provides an overview of the grazing allotments that occur in the MBPA. Currently, cattle are permitted to graze on all allotments. Antelope Powers is also permitted to graze sheep. No livestock grazing permit has been issued for the stock drive trail; however, grazing may be authorized on an annual basis to accommodate livestock being trailed onto or off the grazing allotments. Most allotments are used for livestock grazing during the winter and early spring. The Wetlands grazing allotment is grazed almost year round per an established grazing schedule set forth in an allotment management plan. The Wetlands grazing allotment is subdivided into six pastures by approximately 30.5 miles of fence.

The remaining grazing allotments are for the most part unfenced. Short segments (i.e., gap and/or drift fences) exist in areas to help minimize possible livestock trespass situations. Snow provides the majority of the water needed to sustain livestock; however, perennial and ephemeral streams, 38 earthen reservoirs, four guzzlers, and four springs provide the balance of the water needed for livestock. Grazing permittees may also haul water to livestock during dry periods.

The degree to which native rangelands can support animal grazing—its carrying capacity—is based on several factors, including the class of animal grazing, the vegetation communities grazed, the distance to available water, and topography. The carrying capacity of a grazing allotment is defined in terms of Animal Unit Months (AUMs). An AUM is the amount of forage necessary to sustain one cow, five sheep, or five goats for 1 month. Between the six allotments, there are approximately 119,690 acres allocated for livestock grazing within the boundaries of the MBPA, which translates to about 13,035 livestock AUMs[1]. The surface disturbance from historic and ongoing oil and gas activities have reduced acres available for livestock grazing. AUMs have not been reduced for any of grazing permits involved in the MBPA although the livestock grazing operators are currently using less than their permitted use.

BLM classifies grazing allotments into one of three Selective Management Categories: Category M (Maintain), Category I (Improve), and Category C (Custodial). The Maintain designation means that management objectives will ensure that current uses, range conditions, and productivity are maintained. With the Improve designation, current uses, range conditions, and productivity are not in optimal levels and must be addressed. Management objectives will include implementation of actions to improve existing resource conditions and productivity and enhance overall multiple use opportunities. Custodial management means that present management is satisfactory and is the only logical management objective under existing conditions. **Table 3.8.2-1** summaries the details of each lifestock grazing allotment within the MBPA, including the current management categories.

Table 3.8.2-1. Livestock Grazing Allotment Information within the MBPA

Allotment Name	Management Category	Livestock Class	Total Allotment Acres[1]	Acres in MBPA[2]	Percent of Allotment in MBPA	Total AUMs	Calculated AUMs in MBPA[3]
Antelope Powers	M	Cattle/Sheep	44,996	39,371	87.50	4,463	3,905
Castle Peak	M	Cattle	51,824	27,197	52.48	4,760	2,498
Eightmile Flat	M	Cattle	27,550	27,526	99.91	4,266	4,262
Little Desert	M	Cattle	49,361	2,154	4.36	3,804	166
Wells Draw	M	Cattle	10,923	2,641	24.18	1,220	295
Wetlands	I	Cattle	18,481	15,398	83.32	1,666	1,388
Total	**--**	**--**	**203,135**	**114,288**	**--**	**20,179**	**12,514**

Source: BLM 2012b.
[1] BLM 2012b.
[2] Acreage determined using GIS calculations.
[3] Calculated AUMs determined as follows: Total AUMs x Percent of Allotment in MBPA.

3.9 FISH AND WILDLIFE

3.9.1 Wildlife Habitats

The MBPA and surrounding region support a variety of natural vegetation communities and landscape features that offer a diversity of wildlife habitat types. While these habitat types correspond with the vegetation community types discussed in **Section 3.7** above, they are also defined by a number of distinct landscape features such as washes and gullies, rock outcrops and hillsides, cliffs and taluses, and cave and

[1] The difference between the MBPA total and the allotment total is 5,455 acres. About 906 acres within the MBPA are attributed to an unnamed grazing allotment and the remaining acres are associated with the stock drive trail. These acreages were not included in **Table 3.8.2-1**.

mine entrances. All these features contribute to the diversity and abundance of wildlife in the area because they generally provide a microhabitat for wildlife uniquely adapted to or dependent on these features. Although the MBPA encompasses approximately 119,743 acres, past oil and gas development has highly fragmented wildlife habitats in the area.

3.9.2 General Wildlife

Small mammals potentially found within the MBPA and surrounding region include the cottontail rabbit, black-tailed jackrabbit, coyote, badger, striped skunk, western spotted skunk, and various species of rodents and bats. Bird species that may be present include the black-throated sparrow, Say's phoebe, ferruginous hawk, Brewer's sparrow, sage sparrow, grasshopper sparrow, and horned lark. Herptiles potentially found in the region include the wandering garter snake, Great Basin gopher snake, milksnake, Great Basin spadefoot toad, smooth green snake, western whiptail, sagebrush lizard, and shorthorned lizard.

Although all of these species are important members of wildland ecosystems and communities, most are common and have wide distributions within the region. Consequently, the relationship of most of these species to the Proposed Project is not discussed in the same depth as species that are considered threatened, endangered, sensitive, of special economic interest, or are otherwise of high interest or unique value.

3.9.3 Big Game

Three primary big game species are known to occur within the MBPA: pronghorn antelope, mule deer, and Rocky Mountain elk. Habitats and management prescriptions for these species as well as their distribution within the MBPA and surrounding region are described below.

3.9.3.1 Pronghorn Antelope

Pronghorn typically inhabit grasslands and semi-desert shrublands of the western and southwestern United States. The species is common in Utah, where it can be found in desert, grassland, and sagebrush habitats (UDWR 2009a). Of these habitats, nearly all pronghorn populations in Utah occur in shrub steppe habitat, where large expanses of low rolling or flat terrain characterize the topography. Pronghorn are typically less abundant in xeric habitats because the abundance of water is important to long-term population viability. Pronghorn habitat in Utah often shows a scarcity of naturally available water (UDWR 2009a). Pronghorn are commonly found in small groups and tend to be most active during the day (UDWR 2009a).

Within the MBPA, pronghorn are the most prominent and widespread big game species. The UDWR manages pronghorn along with other big game herds within the state at the Herd Unit level. Pronghorn that occur within the MBPA and surrounding region are considered to be a part of the Nine Mile Herd Unit (Herd Unit #11). The latest (2008) population estimate for Herd Unit 11 was approximately 625 animals, which is below the 5-year objective for this population (UDWR 2009a). The population has been augmented by recent transplants from other areas, in which the UDWR introduced a total of 115 pronghorn into this herd from 2005 to 2007 (UDWR 2009a).

Pronghorn occupy portions of the MBPA and surrounding region on a year-round basis. They are found in a variety of upland habitats, which are characterized by low rolling, wide-open, expansive areas within shadscale and sagebrush vegetation communities. **Figure 3.9.3.1-1 (Attachment 1)** depicts UDWR-designated pronghorn habitat within the MBPA boundary, which consists of year-long crucial fawning and year-long substantial habitat. **Table 3.9.3.1-1** summarizes pronghorn habitats within the MBPA. Approximately 109,833 acres (92 percent) of the MBPA are designated as year-long crucial fawning habitat for pronghorn. In addition, 1,811 acres (2 percent) of the MBPA are designated as year-long substantial habitat for pronghorn. The remaining acres (6 percent) of pronghorn habitat are unclassified.

Much of the seasonal habitats for pronghorn within the MBPA boundary are interspersed with and fragmented by existing oil and gas development (see **Figure 3.9.3.1-1 – Attachment 1**). Approximately 583 miles of roads and pipelines, 1,671 well pads, and facilities are currently located within year-long crucial fawning and year-long substantial habitat for pronghorn within the MBPA. This has resulted in an estimated 5,073 acres (4.6 percent) and 65 acres (3.6 percent) of surface disturbance to year-long crucial fawning and year-long substantial habitat for pronghorn, respectively within the MBPA.

Table 3.9.3.1-1. Summary of Big Game Seasonal Habitats within the MBPA

Species	Habitat Type	Acres in MBPA	Existing Surface Disturbance (Acres)	Percent of Total Habitat Disturbed within MBPA
Pronghorn Antelope	Year-long Crucial Fawning Habitat	109,833	5,073	4.6
	Year-long Substantial	1,811	65	3.6
Mule Deer	Winter Substantial	1,476	60	4.1
	Year-long Substantial	5,248	176	3.4
	Year-long Crucial Fawning Habitat	2,276	51	2.2
Rocky Mountain Elk	Winter Substantial	10,857	732	6.7
	Year-long Crucial Calving Habitat	7,573	266	3.5

3.9.3.2 Mule Deer

Mule deer are common statewide in Utah. The species can be found in many types of habitat ranging from open deserts to high mountains to urban areas (UDWR 2009a). Typical habitats include short-grass and mixed-grass prairies, sagebrush and other shrublands, coniferous forests, and forested and shrubby riparian areas. Fawn production is closely tied to the abundance of succulent green forage during the spring and summer months, whereas deer are especially reliant on shrubs for forage during the winter (UDWR 2008). Thick-treed habitats may offer shelter from severe weather but offer little in the way of forage (UDWR 2008). Although mule deer are found in a variety of habitats across Utah, they are typically less abundant in grassland and shrub steppe habitats (UDWR 2008). As such, mule deer habitat is limited within the MBPA.

Mule deer that occupy the MBPA are considered to be part of the Nine Mile Herd Unit (Herd Unit #11). The 2010 population estimate for this herd was approximately 4,600 mule deer, which is approximately 46 percent below the population objective of 8,500 animals (UDWR 2011a).

Mule deer occupy portions of the MBPA on a year-round basis. **Figure 3.9.3.2-1 (Attachment 1)** represents UDWR-designated mule deer habitat within the MBPA boundary. Approximately 2,276 acres in the eastern portion of the MBPA have been identified as year-long, crucial value fawning habitat. An additional 5,248 acres located in the northern portion of the MBPA are designated as substantial value, year-long habitat; and 1,476 acres located in the southwestern portion of the MBPA are designated as winter substantial habitat. **Table 3.9.3.1-1** summaries mule deer habitats within the MBPA. These acreages represent approximately 2, 4, and 1 percent of all lands in the MBPA, respectively. The remaining 110,743 acres (92 percent) of land is unclassified for this species.

As a result of extended drought conditions throughout much of the State from 2000 to 2003, mule deer fawn production was low and many crucial winter ranges were lost to wildfire during this period (UDWR 2008). In recent years, weather patterns have moderated in portions of the state and deer herds have slowly increased in those areas. This is evident in the harvest history for Herd Unit 11, which generally reflects an increasing mule deer population from 2005 to 2009; however, the population is still well below the population objective set for this herd (UDWR 2008).

While the extent of seasonal habitats for mule deer are limited within the MBPA boundary, habitats for deer in the MBPA are interspersed with and fragmented by existing oil and gas development (see **Figure 3.9.3.2-1 – Attachment 1**). Approximately 53 miles of roads and 88 well pads are currently located within year-long crucial fawning, year-long substantial, and winter substantial habitat for mule deer within the MBPA. This has resulted in an estimated 51 acres (2.2 percent), 60 acres (4.1 percent), and 176 acres (3.4 percent) of surface disturbance to year-long crucial fawning, year-long substantial, and winter substantial habitat for mule deer, respectively within the MBPA.

3.9.3.3 Rocky Mountain Elk

Elk have an extremely variable diet and can occupy a variety of habitats in Utah (UDWR 2005). Elk are common in most mountainous regions of Utah, where they can be found in mountain meadows and forests during the summer and in foothills and valley grasslands during the winter (UDWR 2009). The species can also be found in the low deserts of Utah (UDWR 2005). Like other members of the deer family, this species relies on a combination of grasses, forbs, and woody plants depending on their availability throughout the year (UDWR 2009a). Elk consume mostly grasses and forbs during the summer and browse during the winter (UDWR 2005). Elk are known to occupy desert shrub and pinyon-juniper communities near and along the western boundary of the MBPA. **Figure 3.9.3.3-1 (Attachment 1)** identifies UDWR-designated elk habitat within the MBPA boundary, which consists of crucial value year-long calving habitat and substantial value winter habitat. **Table 3.9.3.1-1** summaries elk habitats within the MBPA. Approximately 7,573 acres (6 percent) of the MBPA are designated as year-long crucial calving habitat for elk. In addition, 10,857 acres (9 percent) of the MBPA are designated as winter substantial habitat for elk. The remaining 101,413 acres (85 percent) of elk habitat are unclassified.

Elk herds have increased dramatically in Utah over the past 30 years but have generally been more stable in recent years (UDWR 2005). From 2000 to 2003, elk herds were intentionally reduced in many areas of Utah due to persistent drought and poor range conditions (UDWR 2005). Since then, elk herds have been allowed to re-expand towards, or exceed, their population objectives (UDWR 2005). Elk that occupy the MBPA are considered to be part of the Nine Mile Herd Unit (Herd Unit #11). The 2010 population estimate for this herd was approximately 3,150 elk, which is approximately 137 percent above the population objective of 2,300 animals (UDWR 2011a).

While the extent of seasonal habitats for elk are limited within the MBPA boundary, habitats for elk in the MBPA are interspersed with and fragmented by existing oil and gas development (see **Figure 3.9.3.3-1 – Attachment 1**). Approximately 122 miles of roads and 326 well pads are currently located within crucial value year-long calving and winter substantial habitat for elk within the MBPA. This has resulted in an estimated 266 acres (3.5 percent) and 732 acres (6.7 percent) of surface disturbance to crucial value year-long calving and winter substantial habitat for elk, respectively within the MBPA.

3.9.4 Upland Game

Upland game has the potential to occur in the MBPA, which include populations of chukar partridge, ring-necked pheasant, California quail, wild turkey, greater sage-grouse, mourning dove, mountain cottontail rabbit, and desert cottontail rabbit. Habitat for these species can be found throughout the MBPA. Annual fluctuations for most upland game populations closely correlate with annual climatic patterns. Mild winters and early precipitation during the spring are associated with increases in upland game populations. Warm, dry weather during the early summer is generally considered vital for the survival of newly born young of many upland game species (UDWR 2000). Many species of upland game (e.g., cottontail rabbits and mourning doves) easily adapt to human disturbance and can often be found near disturbed/built areas such as well sites and along roadsides. However, the greater sage-grouse has experienced a long-term decline as a result of the degradation and loss of important sagebrush steppe habitat (BLM 2004b). The greater sage-grouse is discussed further under **Section 3.10.2.1.6.**

3.9.5 Waterfowl

Waterfowl species that may be found within the MBPA include the Canada goose, mallard, gadwall, cinnamon teal, blue-winged teal, green-winged teal, northern pintail, American wigeon, northern shoveler, and ruddy duck (BLM 2008b). Waterfowl habitat within the MBPA is limited to ponds and wetlands within the Pariette Wetlands ACEC and along the Green River. These areas support habitat capacity of more than 1,718 ducks and 55 geese during annual spring and fall migration each year (Utah Travel Industry 2012). Pelican Lake and Ouray National Wildlife Refuge to the northeast of the MBPA are important wintering areas for waterfowl because the Green River serves as a migration corridor for much of the waterfowl in eastern Utah.

3.9.6 Migratory Birds, Birds of Conservation Concern, and Utah Partners in Flight Priority Bird Species

Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703-711) and Executive Order (EO) 13186 (66 Federal Register 3853). Pursuant to EO 13186, a Memorandum of Understanding (MOU) among the BLM and USFWS was drafted to promote conservation and protection of migrating birds. EO 13186 sets forth the responsibilities of federal agencies to implement provisions of the MBTA by integrating bird conservation principles and practices into agency activities and by ensuring that Federal actions evaluate the effects of actions and agency plans on migratory birds.

A list of Birds of Conservation Concern (BCC) was developed as a result of a 1988 amendment to the Fish and Wildlife Conservation Act. This Act mandated that the USFWS "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA of 1973." The goal of the BCC list is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions with the recommendation that this list would be consulted on in accordance with EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (USFWS 2008, 2002a). The MBPA is located within BCC Region 16 (Southern Rockies/Colorado Plateau).

The Utah Partners in Flight program has designated several areas along the eastern portion of the MBPA as Bird Habitat Conservation Areas (BHCAs). These BHCAs include the Green River (#37) BHCA, which consists of 463 acres within the MBPA, and Pariette Wetlands (#26) BHCA, which includes 12,432 acres of the MBPA. BHCAs identify areas where bird habitat conservation projects may take place, predicated on concurrence, collaboration, and cooperation with all landowners involved; however, BHCAs have no official status (USC-IWJV 2005).

Based on preferred habitats (i.e., nesting and foraging habitats) and vegetative communities present in the area, a list of migratory bird species that may use the MBPA has been compiled and is discussed below. Those migratory bird species (including special status raptor species) that are Federally listed or candidates for Federal listing under the ESA, or are BLM sensitive are addressed in **Section 3.10** and its subsections. Utah Partners in Flight[2] Priority Species are denoted by an asterisk (*). Non-special status raptor species are addressed in **Section 3.9.7**.

3.9.6.1 Intermountain Basins Mat Saltbush Shrubland, Intermountain Basins Mixed Salt Desert Scrub, and Colorado Plateau Pinyon-Juniper Woodland and Shrubland

The following migratory bird species may be associated with these scrub/shrub communities that comprise the largest proportion of vegetation within the MBPA: black-throated sparrow, black-chinned hummingbird*, common yellowthroat, Lewis's woodpecker, gray flycatcher*, western kingbird, green-tailed towhee, northern mockingbird, Say's phoebe, ferruginous hawk*, and prairie falcon.

3.9.6.2 Intermountain Basins Big Sagebrush Shrubland and Colorado Plateau Mixed Low Sagebrush Shrubland

Although the following birds are often associated with these vegetation communities, they may also use other scrub/shrub vegetation communities as well: Brewer's sparrow*, mountain bluebird, sage sparrow*, grasshopper sparrow*, horned lark, greater sage-grouse*, sage thrasher, and vesper sparrow.

3.9.6.3 Intermountain Basins Shale Badland and Colorado Plateau Mixed Bedrock Canyon and Tableland

Although these birds may forage in other vegetation communities, the following migratory birds may use the badland and rock out crop areas within the MBPA: canyon wren, barn swallow, cliff swallow, common raven, and rock wren.

3.9.7 Raptors

Raptor species that are known to occur within the MBPA and surrounding region year-round or on a seasonal basis include the golden eagle, bald eagle, ferruginous hawk, red-tailed hawk, Swainson's hawk, Cooper's hawk, sharp-shinned hawk, northern harrier, prairie falcon, turkey vulture, American kestrel, great-horned owl, burrowing owl, short-eared owl, long-eared owl, and rough-legged hawk. (BLM 2008b). Most raptor species using the area migrate each fall and return to the region again the

[2] Utah Partners in Flight is a cooperative partnership among Federal, State, and local government agencies as well as public organizations and individuals organized to emphasize the conservation of birds not covered by existing conservation initiatives.

following spring. Exceptions include the golden eagle and great horned owl, which are year-round residents, and the bald eagle and rough-legged hawk, which are rare winter residents. The most commonly occurring raptor species are the golden eagle and ferruginous hawk, which are frequently seen throughout the MBPA.

Nine raptor species are currently known to nest in the MBPA. These include the golden eagle, ferruginous hawk, red-tailed hawk, Cooper's hawk, sharp-shinned hawk, northern harrier, prairie falcon, burrowing owl, and great-horned owl. Although no nests have been found, four other species that could nest in the area include the American kestrel, Swainson's hawk, short-eared owl, and long-eared owl. Most identified nest sites within the MBPA were located on promontory points (e.g., mesa tops, cliff faces, rock outcrops) in areas with slopes greater than or equal to 30 percent. Some raptor species (e.g., great-horned owl, red-tailed hawk, Cooper's hawk, and sharp-shinned hawk) also use pinyon-juniper woodlands and deciduous trees (e.g., cottonwood, boxelder, and Russian olive trees) for nesting; however, these resources are limited within the MBPA.

Data from past raptor inventories were used to evaluate the level and status of raptor nesting activity within the MBPA (BLM 2009b). These inventories were conducted within the region from the period of 1995 to 2008. Results of this information identified some 196 raptor nests within the MBPA. Nest site locations and status of these 196 nests are described in **Table 3.9.7-1**. A total of 72 (37 percent) of the nests were those of golden eagles; 72 (37 percent) were those of ferruginous hawks; 14 (7 percent) were those of red-tailed hawks; 11 (6 percent) were those of burrowing owls; nine (5 percent) were those of prairie falcons; five (3 percent) were those of great-horned owls; three (2 percent) were those of Cooper's hawks; one (less than 1 percent) sharp-shinned hawks; one (less than 1 percent) northern harriers; one (less than 1 percent) short-eared owls; and the remaining eight (4 percent) were unknown as to species.

Of the 196 raptor nests identified within the MBPA, 41 (21 percent) were active for at least some time during the period from 2006 to 2008. Of these active nests, the majority (17 and 18 [85 percent]) belonged to the golden eagle and ferruginous hawk, respectively. The status of these nests with regard to reproductive success is unknown.

All raptor species and their nests are protected from take or disturbance under the MBTA (16 USC, § 703 et seq.). The golden eagle and bald eagle are also afforded additional protection under the Bald and Golden Eagle Protection Act, as amended in 1973 (16 USC, § 669 et seq.). Because golden eagles, bald eagles, ferruginous hawks, and burrowing owls are considered to be special status raptor species, they are discussed in further detail in **Section 3.10.**

Table 3.9.7-1. Number and Activity Status of Raptor Nests Located within the MBPA

Species	Number of Active Nests[1]	Number of Inactive Nests	Total Number of Nests
Red-tailed Hawk	0	14	14
Golden Eagle	17	55	72
Ferruginous Hawk	18	54	72
Burrowing Owl	2	9	11
Cooper's Hawk	0	3	3
Sharp-shinned Hawk	0	1	1

Species	Number of Active Nests[1]	Number of Inactive Nests	Total Number of Nests
Northern Harrier	0	1	1
Prairie Falcon	2	7	9
Great-horned Owl	1	6	5
Unknown	1	7	8
Total	**41**	**157**	**196**

[1]Activity status is for the period of 2006 – 2008.

3.10 SPECIAL STATUS SPECIES AND STATE SPECIES OF CONCERN

Special status plant, fish, and wildlife species include those listed as threatened or endangered under the ESA of 1973, as amended; BLM sensitive species; species proposed for listing; species of special concern; other USFWS or BLM species identified as unique or rare; other UDWR or Utah Natural Heritage Program (UNHP) species designated as unique or rare, and which have the potential to occur within the MBPA and surrounding region. The ESA provides protection to federally listed threatened and endangered species from any action that may jeopardize their existence. Species proposed for listing are not protected by the ESA; however, the USFWS works with states, Tribes, private landowners, private partners, and other Federal agencies to carry out conservation actions that prevent further decline of proposed species and possibly eliminate the need for the species to be listed.

Under provisions of Section 7 (a)(2) of the ESA (16 U.S.C. Section 1536), Federal agencies must ensure that any action authorized, funded, or implemented by the agency does not jeopardize the continued existence of any species listed or result in the destruction or adverse modification of critical habitat of such species. BLM Manual 6840—Special Status Species Policy requires the agency to manage and protect BLM sensitive species, which include: species listed or proposed for listing under the ESA; species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA; species designated as BLM sensitive by the State Director; and all federal candidate species, proposed species, and delisted species in the 5 years following delisting. This policy requires BLM to manage BLM sensitive species to reduce the likelihood for such species to be listed pursuant to the ESA.

Based on examination of USFWS, BLM, UDWR, and UNHP data, a total of 25 special status plant species and 33 special status fish and wildlife species were identified as potentially occurring within the MBPA (refer to **Appendix D** and **Appendix E**). Of the 58 special status plant, fish, and wildlife species that were evaluated, 18 plant species and nine fish and wildlife species were eliminated from further consideration in this EIS because either the geographic or elevational range of the species is located outside of the MBPA and/or the MBPA does not provide suitable habitat for the species. The remaining 31 species that have the potential to occur within the MBPA are retained for further evaluation and include eight federally listed species and 21 BLM sensitive species and/or UNHP species of concern (refer to **Appendix D** and **Appendix E**). These species are described further below.

3.10.1 Federally Threatened, Endangered, or Proposed Species

Table 3-10.1-1 lists Federally listed threatened and endangered species that are identified as potentially occurring within the MBPA. A total of eight species or subspecies of plants and animals are addressed in the EIS, four of which are federally listed as endangered, three of which are federally listed as threatened, and one of which is listed as a candidate species. Critical habitat has been designated for four of these species, as indicated in **Table 3-10.1-1** below.

The evaluation of Federally listed threatened and endangered species in this EIS fulfills the compliance requirements of pertinent environmental laws, regulations, and policies in accordance with the requirements of Section 7(b) of the ESA of 1973, as amended, and implementing regulations [16 United States Code (U.S.C.) 1536 (c), 50 CFR 402.12 (f) and 402.14 (c)], and ESA guidance contained in the Endangered Species Consultation Handbook (USFWS and National Marine Fisheries Service 1998).

It is USFWS' policy to consider candidate species when making natural resource decisions. Consequently, candidate species will be included for consideration in this EIS. Biological information on the above-mentioned species is discussed below.

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Table 3.10.1-1. Federally Listed Species Considered for Evaluation in the EIS/BA

Species	Status	Species Listing		Critical Habitat		Abundance	Primary Habitat Use
		Date Listed	Federal Register No.	Date Designated	Federal Register No.		
Birds							
Yellow-billed cuckoo (*Coccyzus americanus*)	C	July 25, 2001[a]	66 FR 8611	N/A	N/A	Uncommon Summer	Riparian Habitats
Fish							
Colorado pikeminnow (*Ptychocheilus lucius*)	E	March 11, 1967	32 FR 4001	March 21, 1994	59 FR 13374	Rare; Green River is an important nursing area	Riverine & Wetlands/ Bottomlands
Bonytail chub (*Gila elegans*)	E	April 23, 1980	45 FR 27713	March 21, 1994	59 FR 13374	Rare; No wild caught in several years	Riverine
Razorback sucker (*Xyrauchen texanus*)	E	October 23, 1991	56 FR 54957	March 21, 1994	59 FR 13374	Rare; Severely reduced in numbers	Riverine & Wetlands/ Bottomlands
Humpback chub (*Gila cypha*)	E	March 11, 1967	32 FR 4001	March 21, 1994	59 FR 13374	Rare; Severely reduced in numbers	Riverine
Plants							
Uinta Basin hookless cactus (*Sclerocactus wetlandicus*)	T	October 11, 1979	44 FR 58869	N/A	N/A	Uncommon to Common	Dry Gravel Terraces
Pariette Cactus (*S. brevispinus*)	T	Original Listing: October 11, 1979 Revised Listing: September 15, 2009	Original Listing: 44 FR 58868 Revised Listing: 74 FR 47112	N/A	N/A	Occurring only in the Pariette Draw	Clay Badlands
Ute ladies'-tresses (*Spiranthes diluvialis*)	T	January 17, 1992	57 FR 2048	N/A	N/A	Rare	Floodplains and Perennial Stream Terraces

E = Endangered, T = Threatened, C = Candidate
[a] 12-Month Finding for a Petition To List the Yellow-billed Cuckoo in the Western Continental United States

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3.10.1.1 Fish and Wildlife

3.10.1.1.1 Western Yellow-billed Cuckoo

The western yellow-billed cuckoo (WYBC) (*Coccyzus americanus*) is a candidate for listing under the ESA. This species is a neotropical migratory species that breeds in the U.S. and Canada and winters in South America (USFWS 2001). Currently, the range of the cuckoo is limited to disjunct fragments of riparian habitats from northern Utah, western Colorado, southwestern Wyoming, and southeastern Idaho, southward into northwestern Mexico, and westward into southern Nevada and California. Cuckoos are long-range migrants that winter in northern South America in tropical deciduous and evergreen forests (Ehrlich et al. 1988).

Historically, cuckoos were probably common to uncommon summer residents in Utah and across the Great Basin (Ryser 1985, Hayward et al. 1976). The current distribution of WYBCs in Utah is poorly understood, though they appear to be an extremely rare breeder in lowland riparian habitats statewide (Walters 1983, Behle 1981, Benton 1987).

WYBCs are one of the latest migrants to arrive and breed in Utah. They arrive in extremely late May or early June and breed in late June through July. Cuckoos typically start their southerly migration by late August or early September. WYBCs feed almost entirely on large insects that they glean from tree and shrub foliage. They feed primarily on caterpillars, including tent caterpillars. They also feed frequently on grasshoppers, cicadas, beetles, and katydids, occasionally on lizards, frogs, and eggs of other birds, and rarely on berries and fruits (Ehrlich et al. 1988, Kaufmann 1996).

The cuckoo is a riparian obligate bird that feeds in cottonwood groves and nests in willow thickets. Nesting habitat is classified as dense lowland riparian that is characterized by a dense sub-canopy or shrub layer (regenerating canopy trees, willows, or other riparian shrubs) within 300 feet of water. Overstory in these habitats may be either large, gallery-forming trees (30 to 90 feet in height) or developing trees (10 to 30 feet in height), usually cottonwoods. Nesting habitats are found at low to mid-elevations (2,500 to 6,000 feet amsl) in Utah. Cuckoos may require large tracts (100 to 200 acres) of contiguous riparian nesting habitat; however, cuckoos are not strongly territorial and home ranges may overlap during the breeding season. Nests are usually 4 to 8 feet above the ground on the horizontal limb of a deciduous tree or shrub, but nest heights may range from 3 to 20 feet and higher. In Utah, this species nests in riparian areas and has been documented in cottonwood habitat along the Green River.

3.10.1.1.2 Colorado Pikeminnow

The Colorado pikeminnow (*Ptychocheilus lucius* [formerly the Colorado squawfish]) is a federally endangered fish species under the ESA. This species is endemic to the Colorado River Basin habitats that are characterized by variable flow, turbulent water, and high silt loads. Within the Colorado River Basin, the Colorado pikeminnow is known to inhabit the Colorado, Green, Duchesne, Price, San Rafael, Gunnison, San Juan, White, and Delores Rivers and numerous associated streams. Today, the species is most abundant in the Green River below the confluence with the Yampa River; the White River from Taylor Draw Dam near Rangely, Colorado, downstream to the confluence with the Green River; and the main stem of the Colorado River from Palisade, Colorado, to Lake Powell. The Gray Canyon and the Yampa River of the lower Green River hold the two critical spawning sites of this species (USFWS 2002b).

The USFWS has designated a total of 726 river miles in Utah as critical habitat for the Colorado pikeminnow. This critical habitat occurs in portions of the Green, Colorado, White, and San Juan Rivers and their respective 100-year floodplains, including portions of the Green River that flow east of the MBPA (USFWS 2007a).

3.10.1.1.3 Bonytail Chub

The bonytail chub (*Gila elegans*) is a federally endangered fish under the ESA. The bonytail chub has historically been a common species along the Colorado River system, but the population has dwindled in recent years (USFWS 1994). This may be due to the introduction of 40 non-native species of riverine fish such as the green sunfish, smallmouth bass, and channel catfish. The bonytail chub is adapted to major river habitats where it has been observed in slow moving pools and eddies. Flooded bottomland habitat is important for growth and conditioning for young bonytail chub and acts as a nursery or transitioning habitat. There are currently no self-sustaining wild populations of bonytail chub. While very few individuals have been caught in the Upper Colorado River Basin, there have been several individuals caught in the Green River at Hideout Canyon and Gray Canyon, and at the confluence of the Colorado and Green Rivers. The release of hatchery-born bonytail chub into the Upper Colorado River Basin have resulted in low survival, reproduction, and recruitment to the population (USFWS 2002c).

In Utah, the USFWS has designated a total of 139 river miles and their associated 100-year floodplains as critical habitat for the bonytail chub in portions of the Green River and Colorado River. The closest designated critical habitat is located in the Green River approximately 20 miles downstream from the MBPA (USFWS 2007a).

3.10.1.1.4 Razorback Sucker

The razorback sucker (*Xyrauchen texanus*) is a federally endangered fish species under the ESA. The razorback sucker currently populates the Green River, upper Colorado River, and San Juan River subbasins in the Upper Colorado River Basin. The general population consists of mostly aged adults with minimal recruitment; however, in the middle Green River, where there are juveniles and young adults, there is a low degree of recruitment. The largest population of razorback sucker exists in low-gradient, flat-water reaches of the middle Green River between the confluences of the Duchesne River and Yampa River (USFWS 2002c). Razorback suckers tend to occupy habitat types such as impounded and riverine areas, eddies, gravel pits, flooded mouths and tributary streams, backwaters, flooded bottoms, and sandy riffles. Adults move into flooded areas in spring to begin spawning migrations as they become reproductively active. Spawning typically occurs over rocky runs and gravel bars (USFWS 2002d).

The USFWS has designated a total of 688 river miles in Utah as critical habitat for the razorback sucker. This critical habitat occurs in portions of the Green, Colorado, Duchesne, White, and San Juan Rivers and their respective 100-year floodplains, including portions of the Green River that flow east of the MBPA (USFWS 2007a).

3.10.1.1.5 Humpback Chub

The humpback chub (*Gila cypha*) is listed as federally endangered fish species under the ESA. In Utah, individuals have inhabited riverine areas from the Upper Green River near Desolation Canyon down to the lower Yampa River, the White River, and the Colorado River below the Glen Canyon Dam. Humpback chub are found in river canyons where they occupy habitats such as river pools, riffles, eddies, rocky runs, and travertine dams. The densest concentrations of humpback chub are in the Westwater

Canyon and Grand Canyon reaches of the Colorado River. Humpback chub in the Desolation and Gray Canyons of the Green River hold the third most abundant population of this species (USFWS 2002e).

In Utah, the USFWS has designated a total of 139 river miles and their associated 100-year floodplains as critical habitat for the humpback chub in portions of the Green River and Colorado River. The closest designated critical habitat is located in the Green River approximately 20 miles downstream from the MBPA (USFWS 2007a).

3.10.1.2 Plants

3.10.1.2.1 Pariette Cactus and Uinta Basin Hookless Cactus

Both the Pariette cactus and Uinta Basin hookless cactus are federally listed as threatened (USFWS 1979, 2009a). Pariette cactus (Heil and Porter 1994) and Uinta Basin hookless cactus (Hochstätter 1989) were formerly included in the federally threatened *Sclerocactus glaucus* (Schumann) Benson species "complex," but are now recognized by the USFWS as distinct species, each retaining its status as federally threatened (USFWS 2007a, 2009b). Separation of the *S. glaucus* species complex into three distinct species is supported by recent genetic studies (Porter et al. 2000, 2006), common garden experiments (Hochstätter 1993a; Welsh et al. 2003), and morphological characteristics (Hochstätter 1993b, Heil and Porter 2004). The former *S. glaucus* species complex populations now recognized as *Sclerocactus glaucus*, or Colorado hookless cactus, occur entirely within the upper Colorado and Gunnison River valleys of western Colorado (USFWS 1990, 2007a) and will not be addressed here. A recovery plan for Uinta Basin hookless cactus (the *S. glaucus* species complex) was published in 1990 (USFWS 1990), prior to the taxonomic revision of the species complex into three distinct species (USFWS 2009b). Recovery outlines were published in April 2010 for Uinta Basin hookless cactus (USFWS 2010a) and Pariette cactus (USFWS 2010b). The original recovery criteria for the *S. glaucus* species complex are no longer sufficient to address the recovery of the now separated species. As such, newly revised recovery plans for the Uinta Basin hookless cactus and Pariette cactus are in development.

The Pariette cactus and Uinta Basin hookless cactus are discussed in the following sections.

Pariette Cactus

Pariette cactus (*S. brevispinus)* is a perennial that occurs as a solitary, unbranched, egg-shaped to short cylindric succulent stem usually 0.75–2.75 inches in diameter by 1 to 3 inches tall that produces pink to purplish flowers from late April to May (Heil and Porter 2004). The Pariette cactus is distinguished from Uinta Basin hookless cactus by its spherical shape, short-hooked or absent central spines, smaller stature, flower size, and retention of juvenile vegetative characteristics in adult flowering plants (Heil and Porter 2004).

The Pariette cactus occurs on fine soils in clay badlands derived from the Uinta Formation within sparsely vegetated salt desert shrubland that is dominated by shadscale, rabbitbrush, and horsebrush from 4,600 to 4,900 feet amsl (USFWS 1990, Heil and Porter 2004). One of the reasons for the susceptibility of Pariette cactus to irreversible population reduction is its specific requirement for habitat with a high percentage of channels on the surface, which form a "desert pavement." Surface disturbance and construction cause the damage or removal of this unique soil substrate, which makes reclamation challenging.

The conservative minimum estimate for the total population of *S. brevispinus* is somewhere in the range of 22,000-29,000 plants within a 204-square-mile (75,400-acre) area from the Pariette Draw along the

Duchesne-Uintah County boundary (USFWS 2012b). Suitable habitat for *S. brevispinus* is not continuous across this area; it is irregularly distributed across the landscape within the area identified as potential habitat. The total area of potential habitat for Pariette cactus is estimated to be about 31,000 acres on BLM lands, and approximately 17,960 acres on Ute Tribal lands (USFWS 2012b). Of the potential *S. brevispinus* habitat on BLM land, 100 percent has been leased for oil and gas development by Newfield Exploration Company and Newfield Energy, which includes the MBPA (USFWS 2012b).

Uinta Basin Hookless Cactus

The Uinta Basin hookless cactus (*S. wetlandicus)* is a perennial that occurs as a solitary, unbranched, round-to-elongate/cylindric succulent stem usually 1.25–3.5 inches in diameter by 2 to 5 inches tall that produces pink to violet flowers from late April to May (Heil and Porter 2004). Observed pollinators include bees, beetles, ants, and flies. Seed dispersal vectors include gravity, ants, birds, rodents, precipitation, and surface water flows. It is theorized that seed dispersal is a limiting factor in the distribution of the species (USFWS 1990). Very little is known about the factors affecting the distribution and long-term population dynamics of the Uinta Basin hookless cactus.

Information on the habitat requirements and distribution of this species has been rapidly changing as more studies and surveys are conducted in the Uinta Basin. Currently, the species is known to occur on Quaternary and Tertiary alluvium soils overlain with cobbles and pebbles of the Duchesne River, Green River, and Uinta Formations between 4,500 to 6,600 feet amsl (BLM 2008b, UNPS 2003-2007). It is also found on gravelly hills and terraces, river benches, valley slopes, and rolling hills along the Green, White, and Duchesne Rivers. Preferred habitat is generally associated with Pleistocene outwash terraces with coarse-textured, alkaline soils overlain by a surficial pavement of large, smooth, rounded cobble. It can be found in a range of vegetative communities including clay badlands, salt desert shrub, and pinyon-juniper woodlands. Associated species include black sagebrush, shadscale saltbush, James' galleta, and Indian ricegrass.

In 2010, the USFWS developed a potential habitat polygon for *S. wetlandicus* and *S. brevispinus* to better assess possible impacts to the species within its range. Although *S. wetlandicus* and *S. brevispinus* populations can be found outside of these areas, they tend to occur at greater numbers and at higher densities within these polygons. The potential habitat polygon is updated annually and was last updated in March 2013 (USFWS 2013).

The total area of potential habitat for *S. wetlandicus* is currently 442,000 acres and includes federal, tribal, state, and private surface lands. The most recent geographic data for *S. wetlandicus* includes more than 18,400 points representing approximately 40,528 individual cacti. Approximately 57,442 acres of USFWS-designated potential habitat for the *S. wetlandicus* has been identified within the MBPA. **Figure 3.10.1.2-1 (Attachment 1)** shows potential cactus habitat areas within the MBPA boundary.

Management Areas for Both Sclerocactus Species

Within known and potential habitat for the Uinta Basin hookless cactus and Pariette cactus, the USFWS has proposed core conservation areas and management recommendations for *S. wetlandicus* and *S. brevispinus* species in response to the ongoing energy development in the Uinta Basin. The purpose of the proposed core conservation areas and management recommendations is to protect the most important populations or sub-populations, and reduce threats to both *Sclerocactus* species. Two levels of core conservation areas were developed based on pollinator travel distance and habitat connectivity between populations and individuals. The core areas are centered on the densest known areas of *Sclerocactus* within a 400 meter (approximately 1,312 foot) buffer for Level 1 and 1,000 meter (approximately 3,821 foot) buffer for Level 2 areas. The Level 1 and Level 2 polygons were developed using kernel density analysis found in GIS software.

The distances used to develop core conservation areas were based on travel distances of common bee species that visit individual plants. These bees are in the small and medium size range and travel approximately 400 to 1,000 meters between plants and nests (Tepedino et al. 2010). Level 1 polygons were developed using a 400-meter buffer around plants to allow for pollinator travel. They include the densest concentrations of cactus locations and the most restrictive management recommendations as proposed by USFWS. Level 2 polygons were developed using a 1,000-meter buffer around plants while incorporating less-dense cactus areas and less restrictive management recommendations as proposed by USFWS. It is important to note that at the time this document was developed, these proposed measures are interim management recommendations that have not been finalized or formally adopted as standard mitigation practices by the BLM.

Approximately 7,484 and 12,955 acres of Level 1 and 2 Core Conservation Areas occur within the MBPA, respectively. Much of the potential habitat for *Sclerocactus*, including Level 1 and 2 Core Conservation Areas, is interspersed with and fragmented by existing oil and gas development (see **Figure 3.10.1.2-1 – Attachment 1**). Approximately 132 miles of roads and 897 well pads are currently located within potential habitat for *Sclerocactus* within the MBPA. This has resulted in an estimated 245 acres and 641 acres of surface disturbance within Level 1 and Level 2 Core Conservation Areas for *Sclerocactus*, respectively, within the MBPA boundary.

3.10.1.2.2 Ute Ladies'-tresses

Ute ladies'-tresses (*Spiranthes diluvialis*) is a federally listed threatened species. A member of the orchid family, this perennial herb occurs on seasonally flooded river terraces, spring-fed stream channels, lakeshores, and in human-modified and disturbed wetlands such as canals, gravel pits, and irrigated meadows (Fertig et al. 2005). Within the Uinta Basin, Ute ladies'-tresses occurs along the Green River near the confluence with the Yampa River, and along Ashley Creek, Big Brush Creek, and the upper Duchesne River and its tributaries (BLM 2005a) above 4,300 feet amsl (BLM 2006b). Ute ladies'-tresses populations require recurrent disturbance, such as seasonal flooding, grazing, or mowing for establishment and persistence and often occur in recently created riparian habitats such as sand bars and backwaters (USFWS 1995a).

There are currently no known occurrences of the species within the MBPA. However, the MBPA is included within the range of the species because it is known to occur in Duchesne and Uintah Counties (Fertig et al. 2005, UNPS 2007, UDWR 2007). Potential habitats within the Project Area include riparian areas, alluvial cobbles or shingles backed by native cottonwoods, and within portions of the Pariette Wetlands.

3.10.2 BLM Sensitive Species and Utah State Species of Concern

Appendix D and **Appendix E** provide a list of BLM sensitive species and Utah State species of concern that are identified as potentially occurring within the MBPA. A total of 21 plant, fish, and wildlife species are addressed in the EIS. This includes four species of mammals, 10 species of birds, three species of fish, and four plant species.

3.10.2.1 Fish and Wildlife

3.10.2.1.1 Fringed Myotis

The fringed myotis is listed as a a BLM sensitive species and UDWR Wildlife Species of Concern (SPC). This species occurs in low desert scrub to fir-pine associations and oak and pinyon-juniper woodlands from 2,400 to 8,900 feet amsl (Oliver et al. 2009). This mammal roosts in caves, mines, and buildings and is most commonly associated with water courses and lowland riparian areas (UDWR 2006). The Colorado Plateau Mixed Bedrock Canyon and Tableland vegetation type covers approximately 4,832 acres of land within the MBPA, which may contain cliffs and rock crevices that are suitable for roosting.

In Utah, this species is known to occur in Washington, Garfield, Kane, San Juan, Uintah, and Grand Counties (UDWR 2006). A few scattered observations of the species have been documented in Uintah County. Approximately 82,156 acres of suitable riparian, desert shrub, and pinyon-juniper woodlands habitats are present within the MBPA. Roosting locations are likely to be present, but none have been identified by the UDWR or BLM. The species has not been documented within the MBPA; however, based on the known range and the presence of suitable habitats, this species has the potential to occur within the MBPA.

3.10.2.1.2 Spotted Bat

The spotted bat is listed as a BLM sensitive species and UDWR SPC. This species occurs in montane forests, pinyon-juniper woodlands, and open semi-desert shrublands from 2,700 to 9,200 feet amsl (Oliver et al. 2009). Approximately, 89,384 acres of suitable foraging habitat has been identified within the MBPA. This species uses crevices in rocky cliffs for roosting habitat, ponderosa pine woodlands during the reproductive season, and lower elevations at other times of the year (Fitzgerald et al. 1994). The Colorado Plateau Mixed Bedrock Canyon and Tableland vegetation type covers approximately 4,832 acres of land within the MBPA, which may contain cliffs and rock crevices that are suitable for roosting. This species is rare in Utah and has not been documented within the MBPA; however, based on the known range and the presence of suitable habitats, this species has the potential to occur within the MBPA.

3.10.2.1.3 Townsend’s Big-eared Bat

The Townsend’s big-eared bat is listed as a BLM sensitive species and UDWR SPC. This species occupies semi-desert shrublands, pinyon-juniper woodlands, and open montane forests from 3,300 to 8,800 feet amsl (Oliver et al. 2009). Approximately, 82,156 acres of suitable foraging habitat has been identified within the MBPA. This species uses caves and abandoned mines for day roosts, but also uses abandoned buildings and rock crevices for refuge (Fitzgerald et al. 1994). The Colorado Plateau Mixed Bedrock Canyon and Tableland vegetation type covers approximately 4,832 acres of land within the MBPA, which may contain cliffs and rock crevices that are suitable for roosting. This species occurs throughout Utah including Uintah County (UDWR 1998). Since the nearest documented occurrence of this mammal is from the Ouray National Wildlife Refuge located northeast of the MBPA (BLM 2008b), this species is likely to occur within the MBPA.

3.10.2.1.4 Big Free-tailed Bat

The big free-tailed bat (*Nyctinomops macrotis*) is listed as a BLM sensitive species and UDWR SPC. The big free-tailed bat is not commonly found in Utah; however, when present, is most often sighted in the southern half of the state. Individual bats have been sighted in north-central Utah, though these occurrences are rare (Oliver 2000). As a migratory species, big free-tailed bats are typically present in Utah during the summer (UDWR 2007). Associated habitats are defined as lowland riparian, desert shrub, and montane forest vegetation communities. Crevices in caves and along cliffs along the Green River corridor serve as potential suitable roosting sites within the Uinta Basin (Oliver 2000). The big free-tailed bat may utilize shrub and riparian woodland habitats within or near the MBPA for foraging. Rock outcrops and ridges within the MBPA and along the Green River outside the MBPA represent suitable roosting habitat for this species. Big free-tailed bats have the potential to occur within the MBPA.

3.10.2.1.5 White-tailed Prairie Dog

The white-tailed prairie dog is listed as a BLM sensitive species and UDWR SPC. In May 2010, the USFWS was petitioned to federally list the white-tailed prairie dog but subsequently determined that it does not warrant protection as a threatened or endangered species under the ESA.

Colonies of this species occur primarily in mountain valleys, semi-desert grasslands, and open shrublands (Fitzgerald et al. 1994). They are distributed in relatively large, sparsely populated complexes and live in loosely knit clans (UDWR 2006b). White-tailed prairie dogs usually occupy areas that are higher in elevation than other prairie dog species, such as black-tailed prairie dogs (*Cynomys ludovicianus*). In Utah, the white-tailed prairie dog occurs predominantly in the Uinta Basin and the northern part of the Colorado Plateau. This species is the main food source of the endangered black-footed ferret (*Mustela nigripes*) (Fitzgerald et al. 1994).

The UDWR and BLM have mapped prairie dog colonies in portions of Uintah and Duchesne Counties to identify suitable habitat. As a result of this effort, some 9,701 acres of white-tailed prairie dog colonies were mapped within the MBPA, the largest of which is 2,375 acres in size. **Figure 3.10.2.1.4-1 (Attachment 1)** depicts the distribution and size of the known colonies within the MBPA. These colonies are considered to be part of the Myton Bench prairie dog complex.

3.10.2.1.6 Greater Sage-grouse

Widespread declines in greater sage-grouse populations throughout the West led to a petition to list the species as threatened under the ESA. Based on accumulated scientific data and new peer-reviewed information and analysis (USFWS 2010b), the USFWS published a finding in the *Federal Register* (50 CFR 17) on March 5, 2010, stating that the greater sage-grouse warrants the protection of the ESA, but listing the species is precluded by the need to address higher priority species first. The greater sage-grouse was placed on the candidate list for future action, meaning that the species will not receive statutory protection under the ESA at this time, and states will continue to be responsible for managing the species. The species is currently listed as a BLM sensitive species.

In Utah, the greater sage-grouse inhabits upland sagebrush grasslands, foothills, and mountain valleys (BLM 2008b, UDWR 2009b). Depending on the season, weather, and nutritional requirements, this species occupies different habitat types during the year. Important areas for sage-grouse are the leks, brood rearing areas, and wintering areas. Leks may be located between summer and winter ranges or, in some cases, summer and winter ranges may be the same (Call and Maser 1985). Preferred nesting habitat occurs up to a 5-mile radius from the leks (Connelly et al. 2000).

Nesting habitat consists of shallow depressions lined with grass or twigs, and are usually located under sagebrush. The principal sage-grouse winter food is sagebrush leaves. During the summer, greater sage-grouse feed on the leaves and fruiting heads of sagebrush; the flower heads of clovers, dandelions, grasses, and other plants; and various insects (Kauffman 1996, UDWR 2002). Greater sage-grouse feed almost exclusively on sagebrush in the winter (Connelly et al. 2000, Patterson 1952) and therefore, are mostly restricted to sagebrush habitats during that season. Because sage-grouse need to access sagebrush, winter habitat tends to exist on south- to west-facing slopes that are less than 10 percent slope and are generally located in windswept areas (Beck 1977, Crawford et al. 2004) where the height of sagebrush exceeds the depth of snow.

The BLM Washington Office IMs No. 2012-043 and 2012-044 (BLM 2011b, 2011c) supplement the BLM's 2004 National Strategy for sage-grouse and identy those management actions necessary to sustain sage-grouse populations, while achieving the DOI's energy-related priorities. The UDWR has not yet identified priority habitat using a consistent methodology. A priorty habitat designation is the highest conservation value that can be given relative to maintaining suitable sage-grouse populations range-wide. The Governor's task force finalized the Conservation Plan for Greater Sage Grouse in Utah in February 2013. The Plan identifies Preliminary Priority Habitat (PPH) and the Preliminary General Habitat for sage-grouse in accordance with IM 2012-044. No PPH occurs within the MBPA. No habitats designated as occupied, brood rearing, or winter habitats for sage-grouse occur within the MBPA. However, an historic sage-grouse lek is located in the MBPA. The lek is known as the Myton Bench – Wells Draw lek and was last reported active in 1999, with six males in attendance (BLM 2009b)**.**

3.10.2.1.7 Bald Eagle

Effective August 8, 2007, the USFWS delisted the bald eagle in the lower 48 states from the Federal list of endangered and threatened wildlife (72 FR 37346, USFWS 2007c). However, the bald eagle is protected under the Bald and Golden Eagle Protection Act and the MBTA. In Utah, bald eagles primarily nest in cottonwood-dominated riparian areas. Individuals nest in large trees or snags with sturdy branches in areas that provide adequate food (fish and carrion) and access to open water. During non-breeding periods (especially during the winter), bald eagles are relatively social and roost communally in sheltered stands of trees. Wintering areas are commonly associated with open water, though other habitats can be used if food resources such as rabbit or deer carrion are readily available.

Although no bald eagle nesting sites exist within or near the MBPA, a number of documented winter roost sites are located along the Pariette Draw and Green River, inside and outside the MBPA. Specifically, three bald eagle roosting sites were identified within the MBPA and six were identified within 1.7 miles of the MBPA along the Green River (BLM 2009b). Winter roosting usually occurs from early November through late March, and bald eagles may use portions of the MBPA as foraging habitat during this period.

3.10.2.1.8 Golden Eagle

The golden eagle is protected by the Bald Eagle and Golden Eagle Protection Act and the MBTA. This species ranges throughout western North America in open, mountainous country and is quite common in Utah (UDWR 2007). The breeding season occurs from late February to March, with nests constructed on cliffs or in large trees (UDWR 2007). The species is sensitive to disturbance to its nesting area; nests are usually a minimum of 0.5 mile apart, and the average territory size is approximately 20 to 55 square miles (NatureServe 2007). The species feeds on rabbits, marmots, and ground squirrels but may also eat a variety of other prey including insects, snakes, birds, juvenile ungulates, and carrion (NatureServe 2007). Populations of golden eagles in Utah are considered to be year-round residents.

Data from past raptor inventories were used to evaluate the level and status of golden eagle nesting activity within the MBPA (BLM 2009b). These inventories were conducted within the region from the period of 1995 to 2008. Results of this information identified some 72 golden eagle nests within the MBPA. Of these, 17 (24 percent) were active for at least some time during the period from 2006 to 2008. Because suitable nesting and foraging habitat is found throughout the MBPA, additional breeding golden eagles could establish territories/nests in the future.

3.10.2.1.9 Ferruginous Hawk

The ferruginous hawk is listed as a BLM sensitive species and UDWR SPC. This species habitat includes grasslands, agricultural lands, sagebrush/saltbush/greasewood, shrublands, and the periphery of pinyon-juniper woodlands. In Utah, the breeding season for ferruginous hawks is March 1 to August 1. Nesting habitat includes trees, cliffs, low hills and knolls, as well as buttes in close proximity to areas with a large prey base such as prairie dogs and jackrabbits (Johnsgard 1990). Nesting sites generally are in areas of high visibility, which makes the ferruginous hawk sensitive to human development. Nesting areas within close proximity to human development are characteristic of lower productivity during reproductive periods (Collins and Reynolds 2005).

Data from past raptor inventories were used to evaluate the level and status of ferruginous hawk nesting activity within the MBPA (BLM 2009b). These inventories were conducted within the region from the period of 1995 to 2008. Results of this information identified some 72 ferruginous hawk nests within the MBPA. Of these, 18 (25 percent) were active for at least some time during the period from 2006 to 2008.

3.10.2.1.10 Short-eared Owl

The short-eared owl is listed as a BLM sensitive species and UDWR SPC. The species breeds in the northern half of Utah, mostly in the northwestern portion of the state, but can be found throughout Utah during non-breeding periods (UDWR 2003). The species is less common in eastern Utah. Local breeding status can be difficult to assess due to the species' tendency to breed opportunistically in response to high rodent densities (UDWR 2003). This owl starts nesting in April on the ground in a small depression excavated by the female (Ehrlich et al. 1988).

Several individual short-eared owls, nest sites, and suitable habitat have been identified within MBPA. Data from past raptor inventories that were conducted within the region from the period of 1995 to 2008 (BLM 2009b) documented a single short-eared owl nest within the MBPA, although it is likely that additional undocumented nests occur in the area.

3.10.2.1.11 Burrowing Owl

The burrowing owl is listed as a BLM Sensitive Species and UDWR SPC. Burrowing owls are summer residents on the plains over much of Utah and usually arrive on breeding grounds from late March to mid-April (Johnsgard 2002). Burrowing owls are relatively tolerant of human activity and have been known to make their homes in cow pastures, fields surrounding airports, ranch and farm land, or in close proximity to highways. In addition, burrowing owls serve as prey for larger raptors, foxes, and coyotes. Burrowing owl individuals, nest sites, and suitable habitat have been identified within MBPA. Data from past raptor inventories that were conducted within the region from the period of 1995 to 2008 (BLM 2009b) documented 11 burrowing owl nests within the MBPA, although many more undocumented nests are likely to occur in the area. Approximately 9,701 acres of mapped white-tailed prairie dog colonies exist within the MBPA, which serve as suitable habitat for the burrowing owl.

3.10.2.1.12 Lewis's Woodpecker

Lewis's woodpecker is listed as a BLM sensitive species and UDWR SPC because of its limited distribution within the state and recent range-wide decreases in population size. This woodpecker is a permanent resident to western North America. In the State of Utah, it is found primarily in the riparian habitats of the Uinta Basin and along the Green River. Approximately 6,843 acres of potential woodland habitat have been identified within the MBPA. Lewis's woodpecker is widespread in Utah but is an uncommon nester along the Green River. Breeding behavior for this species has been observed in Ouray and Uintah Counties and along Pariette Wash (Kingery 1998, UDWR 2011b). The species dwells in pine forests, riparian areas, and pinyon-juniper woodlands. The breeding season for Lewis's woodpecker is mid-May to mid-August. Breeding occurs in ponderosa pine and cottonwood woodlands in stream bottoms and farm areas.

3.10.2.1.13 American White Pelican

The American white pelican (*Pelecanus erythrorhynchos*) is listed as a BLM sensitive species and UDWR SPC. This species also is protected under the MBTA. Geographically this species is found in the northern part of Utah and is generally concentrated around the Great Salt Lake and Utah Lake. As a migratory species, the American white pelican is present in northern Utah during fall and spring migrations. American white pelicans primarily select nesting habitat in Utah on islands, with a preference for those found in fresh water lakes. Foraging habitat in Utah is defined as shallow lakes, marshlands and rivers as the preferred diet of the American white pelican is shallow water fish. Breeding areas are often distant from foraging areas and are usually separated by a buffer greater than 50 kilometers (UDWR 2007). While the no nesting habitat is located within the MBPA, the American white pelican may utilize foraging habitat within the Green River, and the species may occur in the MBPA.

3.10.2.1.14 Long-billed Curlew

The long-billed curlew (*Numenius americanus*) is listed as a BLM sensitive species and UDWR SPC. This species also is protected under the MBTA. As a migratory bird, this species is only present in Utah during the summer, usually arriving in March, and most often inhabits the central and northern valleys of the state. The long-billed curlew is not common within the Colorado River drainage as it prefers to breed in higher and drier meadowlands (UDWR 2007). This species preferred breeding habitat consists of dry grasslands with sufficient cover and a high occurrence of prey species (Pampush 1980). Uncultivated grasslands and pastures are significant habitats for continental long-billed curlew breeding populations (Johnsgard 1981). The long-billed curlew diet typically includes crustaceans, mollusks, worms, toads, insects, and less often berries and nesting birds (UDWR 2007).

While not common in the Colorado River watershed, long-billed curlews have been observed nesting in the Ouray National Wildlife Refuge (USFWS 2000). Potential nesting and foraging habitat does exist within the MBPA within grassland areas and along the Green River and Pariette Draw; however, potential for this species to occur within the MBPA is low.

3.10.2.1.15 Mountain Plover

In addition to being listed as a UDWR SPC, the mountain plover is listed as a Utah Partners in Flight (UPIF) priority species (Parrish et al. 2002), and a Utah Natural Heritage Program Critically Imperiled S1 species (UDWR 2010b). The species is also listed as a BCC for the USFWS Mountain-Prairie Region (USFWS 2008). The mountain plover was originally proposed as threatened under the ESA in 1999, but the proposal was withdrawn in 2003. The proposed rule for listing was reinstated in 2010, and it was determined in May 2011 that the species does not warrant protection under the ESA (USFWS 2011).

Most of the mountain plover breeding range is in Colorado, Montana, and Wyoming. However, one known historic breeding population has been documented in Utah on Myton Bench in Duchesne County. In Utah, individuals in this population have shown consistent site fidelity, returning to the same breeding site year after year (Manning and White 2001). However, the population has declined greatly in recent years, with no breeding bird sightings since 2005 (UDWR 2011b).

As shown in **Figure 3.10.2.1.12-1 (Attachment 1)**, approximately 75,701 acres were identified as suitable mountain plover habitat and 455 acres as concentration areas for the species within the MBPA. Utah mountain plovers differed in habitat choice from the traditional shortgrass prairie that was generally associated with the species, preferring instead a shrub-steppe habitat type. Breeding birds in this region were found among white-tailed prairie dogs and near roadways or oil well pads (Manning and White 2001).

3.10.2.1.16 Roundtail Chub

The roundtail chub is listed as a BLM sensitive species and a Utah State sensitive species receiving special management under a Conservation Agreement in order to preclude the need for a federal listing. Roundtail chub is found in the UCRB. This species is a large member of the minnow family found most often in major rivers and smaller tributary streams. The roundtail chub has been described as varying from sedentary to mobile, depending on life stage and habitat conditions (Sigler and Sigler 1996).

Roundtail chub populations occur in the Green River from the Colorado River confluence upstream to Echo Park and in the White River from the Green River confluence upstream to near Meeker, Colorado. In the UCRB (States of Utah, Wyoming, Colorado, and New Mexico), the species has been extirpated from about 45 percent of its historical range, including the White River and portions of the San Juan, Gunnison, and Green Rivers. Data on smaller tributary systems are largely unavailable, and population abundance estimates are available only for short isolated river reaches. Known distribution of this species includes portions of the Green River east of the MBPA (UDWR 2007).

3.10.2.1.17 Bluehead Sucker

The bluehead sucker is listed as a BLM sensitive species and a Utah State sensitive species receiving special management under a Conservation Agreement in order to preclude the need for a federal listing. Bluehead sucker is found in the UCRB. This fish occurs in small to large streams, rivers, and tributaries in the Upper and Lower Colorado River Basin, including the Green River. Large adult bluehead may inhabit stream environments as deep as 6 to 9 feet, although they most commonly feed in riffles and swift runs. Spawning occurs in spring and early summer at lower elevations and mid- to late-summer in higher, colder waters. Spawning occurs on gravel beds in shallow water (Sigler and Sigler 1996).

Populations of this species currently occur in the mainstream Green River from the Colorado River confluence upstream to Lodore, Colorado, and in the White River from the Green River confluence upstream to Meeker, Colorado. In the UCRB (States of Utah, Wyoming, Colorado, and New Mexico), bluehead suckers currently occupy about 45 percent of their historical habitat. Recent declines of the species have occurred in the White River below Taylor Draw Dam and in the upper Green River. Known distribution of this species includes portions of the Green River east of the MBPA (UDWR 2007).

3.10.2.1.18 Flannelmouth Sucker

The flannelmouth sucker is listed as a BLM sensitive species and a Utah State sensitive species receiving special management under a Conservation Agreement in order to preclude the need for a federal listing. Flannelmouth sucker is found in the UCRB. This species typically inhabit deep water habitats of large rivers, but are also found in small streams and occasionally in lakes. Flannelmouth suckers spawn during March and April in the southern portions of Utah and from May to June in northern Utah at higher elevations (Sigler and Sigler 1996).

Flannelmouth sucker populations can be found in the Green River from the Colorado River confluence upstream to the Flaming Gorge Reservoir and the White River from Taylor Draw in Colorado to the Green River. Recent investigations of historical accounts and museum specimens indicate that flannelmouth suckers occupy approximately 50 percent of their historic range in the UCRB (States of Utah, Wyoming, Colorado, and New Mexico). Populations have declined since the 1960s due to impoundment of the Green River in Wyoming and Utah (Flaming Gorge Reservoir) and the Colorado River in Glen Canyon, Utah (Lake Powell). The known distribution of this species includes portions of the Green River east of the MBPA (UDWR 2007).

3.10.2.2 Plants

3.10.2.2.1 Barneby's Catseye

Barneby's catseye (*Cryptantha barnebyi*) is a BLM sensitive plant species. This perennial herb is a member of the borage family that inhabits regions with oil shale, gently sloping white shale barrens, and the semi-barren shale knolls of the Green River Formation. Due to the limits of soil requirements, this species is endemic to the Uinta Basin. This plant is generally associated with pinyon-juniper, shadscale, rabbitbrush, and sagebrush communities at elevations between 6,000 and 7,900 feet amsl (UNPS 2009).

While little is known about the habitat requirements for this species, suitable habitat exists within MBPA based on the vegetation, soil, and elevation associations required by the species. These conditions give Barneby's catseye a moderate potential for occurrence within the MBPA. Potential threats to this species include habitat loss and fragmentation as a result of oil and gas development, mineral and building material development, road development, off-highway vehicle (OHV) travel, and grazing (BLM 2012b).

3.10.2.2.2 Graham's Catseye

Graham's catseye (*Cryptantha grahamii*) is a BLM sensitive plant species. This species is a long-lived perennial that belongs to the borage family and typically flowers between May and June. Graham's catseye inhabits Green River Shale soils, which make it endemic to Uintah and Duchesne Counties in the Uinta Basin. This plant is often found in mixed sagebrush, desert shrub, mountain brush, and pinyon juniper vegetation communities that occur at elevations between 5,000 to 7,400 feet amsl (UNPS 2007).

Not much information exists on the species habitat requirements and population dynamics (UNPS 2009). However, the formation and soils known to serve as habitat for Graham's catseye are found in the area and provide a moderate potential for occurrence within the MBPA. Potential threats to this species include habitat loss and fragmentation as a result of oil and gas development, mineral and building material development, road development, OHV travel, and grazing (BLM 2012b).

3.10.2.2.3 Green River Greenthread

The Green River greenthread (*Thelesperma pubescens var. caespitosum*) is a BLM sensitive plant species. This member of the sunflower family is endemic to Duchesne County. Its habitat consists of white shale slopes and ridges of the Green River Formation at elevations between 5,900 feet to 8,400 feet amsl (UNPS 2007).

While little is known about the specific habitat requirements for this species, there is a moderate potential that suitable habitat exists within the MBPA based on the vegetation, soil, and elevation associations required by the species. Potential threats to this species include habitat loss and fragmentation as a result of oil and gas development, mineral and building material development, road development, OHV travel, and grazing (BLM 2012b).

3.10.2.2.4 Sterile Yucca

The sterile yucca (*Yucca sterilis*) is listed as a BLM sensitive species. It is a member of the agave family and produces yellow- to cream-colored flowers. This species produces vegetatively through root stems that branch into new plants. Sterile yucca are found in salt desert shrub, sagebrush, juniper, and shadscale communities at elevations between 4,800 to 5,800 feet amsl (UNPS 2007).

There is a moderate potential that suitable habitat for this species exists within MBPA based on the vegetation, soil, and elevation associations required by the species. Potential threats to this species include habitat loss and fragmentation as a result of oil and gas development, mineral and building material development, road development, OHV travel, and grazing (BLM 2012b).

3.11 CULTURAL RESOURCES

Cultural resources are defined as both prehistoric and historical archaeological sites and structures, as well as non-archaeological and non-structural sites (i.e., waterways, viewsheds, and resource areas) that have been identified as important for traditional and/or ideological reasons by the Native American groups with ancestral and/or present ties to the area.

Prehistoric and historic sites and structures are the tangible remains of past activities that show use or modification by people. They are distinct geographic areas that can include artifacts, features (for example, hearths, rock alignments, trails, rock art, railroad grades, canals and roads), landscape alterations, or architecture. Many of these cultural resources have multiple associations and use values. These non-renewable resources provide a record of prehistoric and historical cultures and events and have use values for many contemporary groups, including local residents, scientists, and Native Americans.

Unless otherwise noted, the information in this section has been adapted from the *Class I Existing Data Review for Newfield Exploration and Production's Greater Monument Butte Project Area, Duchesne and Uintah Counties, Utah* (Montgomery Archaeological Consultants, Inc. [MOAC] 2011).

3.11.1 Area of Potential Effects

In accordance with 36 CFR 800 (implementing regulations for the NHPA), an APE has been established within which direct and indirect effects on cultural resources resulting from the Proposed Action and Alternatives could occur (ACHP 2004). The APE consists of the MBPA, which is bordered to the north by Pleasant Valley, to the south by Eightmile Flat, to the east by the Green River, and to the west by Wells Draw (see **Figure 1-1 – Attachment 1**).

3.11.2 Prehistoric Resources

The prehistoric-chronological sequence represented within the MBPA includes the Paleo-Indian, Archaic, Fremont, and Protohistoric stages. The earliest inhabitants of the region are representative of the Paleo-Indian stage (ca. 12,000-8000 B.P.), which is characterized by the adaptation to terminal Pleistocene environments and the exploitation of big game fauna. The discovery of Clovis and Folsom fluted points (ca.12,000 B.P. - 10,000 B.P.) as well as the more recent Plano Complex lanceolate points (ca. 10,000 B.P. - 7000 B.P.) implies the presence of Paleo-Indian hunters in the Uinta Basin region.

The Archaic stage (ca. 8000 B.P.-1500 B.P.) relates to the dependence on a foraging subsistence, with people seasonally exploiting a wide spectrum of plant and animal species in different ecozones. The shift to an Archaic lifeway was marked by the appearance of new projectile point types and the development of the atlatl, perhaps in response to a need to pursue smaller and faster game.

The Formative stage (A.D. 500-1300) is recognized in the area as the Uinta Fremont. This stage is characterized by reliance upon domesticated corn and squash, increasing sedentism, and substantial habitation structures, pottery, and bow and arrow weapon technology during its later periods. Traits considered unique or predominate to the Uinta Basin include calcite-tempered pottery, two-handled wide-mouth vessels, Utah type metates, the use of Gilsonite for pottery repair, settlement on tops of buttes, and large-shouldered bifaces.

For the Protohistoric stage, the archaeological evidence suggests that Numic people appeared in east-central Utah at approximately A.D. 1100 or shortly before the disappearance of Formative-stage people. The archaeological remains of Numic-speaking Utes consist primarily of lithic scatters with low quantities of brown ware ceramics, rock art, and occasional wickiups. The Ute appear to have been hunters and gatherers who exploited various fauna and flora resources.

3.11.3 Historical Resources

The earliest recorded visit by Europeans to Utah was the Dominguez-Escalante expedition of 1776. From the early 1820s to 1845, the Uinta Basin became an important part of the expanding fur trade in the West.

3.11.3.1 Duchesne County

During the 1880s, the U.S. Army established the earliest permanent European settlements and associated developments within what would later become Duchesne County. The area was gradually opened up for settlement by giving applicants the opportunity to claim land grants of 160 acre parcels under the Homestead Act. The origin of the Price-Myton Freight Road began with the establishment of Fort Duchesne in 1886. Because the 300 or so troops stationed at this remote fort required a means of acquiring supplies, a service route was chosen that essentially linked the fort to the developing market center of Price. The discovery of Gilsonite in the area sparked the development of Gilsonite mines and boosted the freight road. By 1905, the Uintah Railway had constructed a spur from Mack, Colorado to Dragon, Utah to capture some of the Gilsonite mining transportation. A number of mines were developed in subsequent years but were abandoned in the late 1960s.

3.11.3.2 Uintah County

Beginning in the 1850s, livestock was the main industry of white homesteaders in Uintah County. The K Ranch, a large cattle operation owned by P.R. Keiser, brought many cowboys to the area. The ranch was located on the Utah-Colorado line with property in both states. The sheep industry later became part of Uintah County's economic backbone and contributed to the decline of the cattle industry. Sheep were first introduced to the valley during the winter of 1879 when Robert Bodily brought in sixty head. By 1906, the Uintah Railway Company built shearing pens on the Green River to encourage the shipping of wool by train. In addition, shearing pens were built in 1912 in the communities of Bonanza and Dragon, Utah. During the 1940s, Mexican sheep-shearing crews and Greek sheepmen from the Price and Helper areas came into the area. The Taylor Grazing Act was passed in 1934, which allotted specific areas or "districts" to stockmen for livestock grazing that required permits. This act was a forerunner of the BLM agency, which was established in 1946 and eventually assumed responsibility for the administration of grazing laws on public land.

3.11.4 Regulatory Framework

Federal legislation for historic preservation provides a legal environment to document, evaluate, and protect cultural resources that may be affected by federal undertakings, or by private undertakings operating under federal license, with federal funding, or on federally managed lands. These include the NHPA (16 U.S.C. 470), as amended; the Archaeological and Historic Preservation Act (AHPA) of 1974 (16 U.S.C.469-469c); and the ARPA (16 U.S.C. 470aa-470mm), as amended. Executive Order 11593 also provides necessary guidance on the protection and enhancement of cultural resources.

The NHPA requires federal agencies to take into account the effects of their actions on properties listed or eligible for listing on the NRHP. Section 106 of the NHPA establishes a four-step review process through which cultural resources are given consideration during the evaluation of proposed undertakings. The regulations require that federal agencies initiate Section 106 early in the project planning when a broad range of alternatives can be considered (36 CFR 800.1[c]).

3.11.5 Eligibility Criteria for Listing Cultural Resources on the NRHP

The NPS on behalf of the Secretary of the Interior maintains the NRHP, the nation's inventory of significant cultural resources. The NPS has established three main standards that a cultural resource must meet to qualify for listing on the NRHP: age, integrity, and significance. To meet the age criteria, a cultural resource generally must be at least 50 years old (except in special circumstances). To meet the integrity criteria, a cultural resource must "possess integrity of location, design, setting, materials, workmanship, feeling, and association" (36 CFR 60.4). Finally, to qualify for significance, a cultural resource meets one or more of the following evaluation criteria (NPS 1995):

- Be associated with events that have made a significant contribution to the broad patterns of U.S. history (Criterion A); or
- Be associated with the lives of significant persons in U.S. history (Criterion B); or

- Embody the distinctive characteristics of a type, period, or method of construction or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C); or
- Have yielded, or may likely yield, information important in prehistory or history (Criterion D).

3.11.6 Cultural Resources Investigation Within the MBPA

A Class I data review was conducted for MBPA at the SHPO on August 13, 2011. The objective of the existing data review was to conduct archival record searches of any previously documented cultural resource inventories or recorded archaeological sites within the MBPA. The Class I report stated that 255 previous cultural resource inventories were completed in the MBPA since 2000. The majority of the projects were conducted for oil and gas developments. Since 2005, most of the archaeological surveys were performed for Newfield Exploration Company. A total of 1,123 archaeological sites were previously documented in the MBPA. These sites include prehistoric (n=599), historic (n=468), and multicomponent (n=56).

3.11.6.1 Prehistoric Sites

Prehistoric cultural resources located in the MBPA were classified as one or more site types, including temporary camp, lithic scatter, rock art, habitation, and rock shelter. Camp sites typically contain evidence of temporary habitation in the form of domestic trash and the presence of features such as hearths, cists, and tent rings. Lithic scatters are often similar to camp sites but lack constructed features. Rock art refers to sites containing either petroglyphs or pictographs on cliffs or boulders. Habitation sites refer to sites occupied continuously or seasonally for extended periods of time. Habitation sites often contain features that required substantial investments of time or resources to construct, such as standing architecture or slab-lined storage sites. The distinguishing characteristic of a rockshelter is a natural alcove in a cliff or large boulder that was used by prehistoric inhabitants of the area. Some of these rockshelters may have served as camp or habitation sites. **Table 3.11.6.1-1** provides a list of the prehistoric sites that were identified during the Class I data review.

Table 3.11.6.1-1. Cross Tabulation of Prehistoric Affiliation and Site Type for the MBPA

Site Type	Paleo-Indian	Paleo-Indian/ Archaic	Paleo-Indian/ Numic	Archaic	Archaic/ Fremont	Fremont	Fremont/ Numic	Numic	Unknown Aboriginal	TOTAL
Lithic Scatter	4	1	1	18	1	6		2	315	**348**
Temporary Camp	1	--	1	13	--	1	1	1	97	**115**
Quarry	--	--	--	1	--	--	--	--	62	**63**
Hearth	--	--	--	--	--	--	--	--	3	**3**
Cist	--	--	--	--	--	--	--	--	5	**5**

Site Type	Paleo-Indian	Paleo-Indian/ Archaic	Paleo-Indian/ Numic	Archaic	Archaic/ Fremont	Fremont	Fremont/ Numic	Numic	Unknown Aboriginal	TOTAL
Rockshelter	--	--	--	2	--	5	--	--	37	**44**
Rock Art	--	--	--	--	1	1	--	--	5	**7**
Lithic-Ceramic Scatter	--	--	--	--	--	2	--	--	--	**2**
Ceramic Scatter	--	--	--	--	--	1	--	1	--	**2**
Fire-cracked Rock Concentration	--	--	--	--	--	--	--	--	2	**2**
Burial	--	--	--	--	--	--	--	1	--	**1**
Habitation	--	--	--	--	--	--	--	--	1	**1**
Structure	--	--	--	--	--	--	--	--	1	**1**
Rock Wall	--	--	--	--	--	--	--	--	1	**1**
Rock Alignment	--	--	--	--	--	--	--	--	2	**2**
Game Drive	--	--	--	--	--	--	--	--	1	**1**
Bison Remains	--	--	--	--	--	--	--	--	1	**1**
TOTAL	**5**	**1**	**2**	**34**	**2**	**16**	**1**	**5**	**533**	**599**

Source: MOAC 2011

3.11.6.2 Historic Sites

Historic sites of European-American affiliation represent the majority of the recorded cultural resources within the MBPA. The predominate site types are temporary camps (n=233) and trash scatters (n=118), followed by rock cairns (n=38) and mines or mining prospects (n=21). These common sites are classified under the historic themes of ranching/agricultural and Gilsonite mining in the Uinta Basin. Other European-American historic site types include inscriptions, corrals, canals, rock art, stock driveways hearths, a grave, a road, a benchmark, and a Civilian Conservation Corps (CCC) dam. Since the MBPA borders the Uintah-Ouray Reservation, several Ute Indian affiliated sites have been documented, which consist of a rock art panel, a grave, and a rock shelter. **Table 3.11.6.2-1** provides a list of the historic sites that were identified during the Class I data review.

Table 3.11.6.2-1. Cross Tabulation of Historic and/or Ute Affiliation and Site Type for the MBPA

Site Type	European American	Ute Indian	European American Ute Indian	TOTAL
Temporary Camp	232	--	1	**233**
Trash Scatter	118	--	--	**118**
Cairn	38	--	--	**38**
Mine or Mining Prospect	21	--	--	**21**
Inscription	8	--	--	**8**
Corral	3	--	--	**3**
Canal	2	--	--	**2**
Rock Art	2	1	--	**3**
Stock Driveway	3	--	--	**3**
Grave	1	1	--	**2**
Hearth	2	--	--	**2**
Rockshelter	--	1	--	**1**
Road	1	--	--	**1**
Rock Alignment	1	--	--	**1**
Rock Concentration	1	--	--	**1**
Bench Marker	1	--	--	**1**
CCC Dam	1	--	--	**1**
Dual Site Function	27	--	1	**28**
TOTAL	**462**	**3**	**2**	**467**

Source: MOAC 2011

3.11.6.3 Multi-Component Sites

Multicomponent sites consist of cultural resources with at least two distinct cultural affiliations or temporal periods and are spatially associated with one another. As applied here, multicomponent sites consist of the same site types and cultural affiliations described above for prehistoric and historic sites. **Table 3.11.6.3-1** provides a list of the multi-component sites that were identified during the Class I data review.

Table 3.11.6.3-1 Cross Tabulation of Multi-Component Affiliation and Site Type for the MBPA

Site Type	European American	Archaic	Fremont	Unknown Aboriginal	TOTAL
Prehistoric Lithic Scatter Historic Trash Scatter	yes	--	--	yes	**21**
Prehistoric Lithic Scatter Historic Temporary Camp	yes	--	--	yes	**12**
Prehistoric Lithic Scatter Historic Mining Prospect	yes	--	--	yes	**2**
Prehistoric Temporary Camp Historic Trash Scatter	yes	--	--	yes	**3**
Prehistoric Temporary Camp Historic Inscription	yes	--	--	yes	**2**
Prehistoric Lithic-Ceramic Scatter Historic Temporary Camp	yes	--	yes	--	**1**
Prehistoric Temporary Camp Historic Trash Scatter	yes	yes	yes	--	**1**
Prehistoric Groundstone Historic Rock Art or Graffiti	yes	--	--	yes	**2**
Prehistoric Quarry Historic Trash Scatter or Camp	yes	--	--	yes	**2**
Rockshelter	yes	--	--	yes	**1**
Prehistoric Rockshelter Historic Coyote Trap	yes	--	--	yes	**1**
Prehistoric Rockshelter Historic Trash Scatter	yes	--	--	yes	**1**
Prehistoric Rockshelter Historic Temporary Camp	yes	--	--	yes	**1**
Temporary Camp	yes	--	--	yes	**1**
Prehistoric Lithic Scatter Historic Cairn	yes	--	--	yes	**1**
Prehistoric Lithic Scatter Historic Corral	yes	--	--	yes	**2**
Prehistoric Lithic Scatter Historic Well Location	yes	--	--	yes	**1**
Prehistoric Projectile Point Historic Temporary Camp	yes	--	--	yes	**1**
TOTAL	--	--	--	--	**56**

Source: MOAC 2011

3.11.6.4 NRHP Eligibility of Sites Identified Within the MBPA

A total of 363 prehistoric sites have been evaluated as eligible to the NRHP as outlined in 36 CFR 60.4. Eligible prehistoric sites are dominated by lithic scatters (49 percent), followed by temporary camps (28 percent), and rockshelters (11 percent). The vast majority of the these prehistoric sites are deemed eligible to the NRHP because they qualify for significance under Criterion D (have yielded, or may be likely to yield, information important in prehistory).

Thirty-six historic sites have been evaluated as eligible to the NRHP as outlined in 36 CFR 60.4. Eligible sites consist of temporary camps (n=15), mine or mining prospects (n=5), stock driveways, inscriptions (n=2), a trash scatter, a canal, rock art, and a grave. These sites are grouped under the historic themes of ranching/agriculture and Gilsonite mining. Qualifications for significance for these cultural resources are primarily based on Criterion A (strongly associated with historical events or patterns) and Criterion D.

A total of 30 multicomponent sites are evaluated as eligible to the NRHP and are dominated by prehistoric lithic scatters and historic trash scatters or temporary camps. Multicomponent sites in the MBPA are evaluated as eligible to the NRHP as outlined in 36 CFR 60.4. They qualify for significance under Criterion D based on the importance the prehistoric components of the sites are likely to contribute to the prehistory of the area.

3.11.7 Summary of Cultural Resources

The Class I data review for the MBPA resulted in the identification of 255 previous cultural resource inventories and 1,123 archaeological sites within a 187 square mile study area. These totals indicated a relatively moderate site density for the study area of nearly six sites per square mile. Approximately 97 percent of the MBPA has been previously block surveyed. As such, the results listed in **Tables 3.11.6.1-1, 3.11.6.2-1** and **3.11.6.3-1** may not be representative of the entire MBPA. Therefore, it is assumed that additional archaeological sites or artifacts (which are eligible for nomination on the NRHP) may exist in the MBPA, and site density may be higher than six sites per square mile.

3.12 LAND USE AND TRANSPORTATION

3.12.1 Land Use

As described in **Chapter 1.0**, approximately 87 percent of surface acres within the MBPA are managed by the BLM, about 11 percent are managed by the State of Utah, and the remaining acreage is privately owned. The primary land uses within and adjacent to the MBPA include oil and gas development, livestock grazing, hunting, and dispersed recreation. For details regarding these specific land uses, refer to **Sections 3.8**, **3.9**, and **3.13**. Lands are developed for agricultural uses along the northern boundary of the MBPA adjacent to Pariette Wash. Outside of this geographic area, minimal cropland is cultivated, given the predominance of dry desert shrubland that is typical of the Uinta Basin.

Road and utility ROWs are present within the MBPA, although their precise number and extent are not known. Many of the ROWs are related to well field activities. In addition, other roads exist within the MBPA, which are described in **Section 3.12.2** below. No commercial structures or private residences are built within the MBPA. The nearest residential community is Myton, Utah (population 550), which is located approximately 6 miles north of the MBPA's northern boundary.

3.12.2 Transportation

A network of Federal and State highways and county roads provide access to the MBPA. The Utah Department of Transportation (UDOT) monitors the use of Federal and State transportation corridors. As illustrated in **Figure 3.12.2-1 (Attachment 1)**, BLM, county, and operator-maintained roads provide access to leases, wells, and ancillary facilities within the MBPA.

3.12.2. Federal and State Highways

The road network of northeastern Utah is generally oriented to through-traffic and access between the dispersed, small population centers. Access to the MBPA is primarily from the north on U.S. 40/U.S. 191, which is a two-lane, all-weather highway in Utah's primary highway system. The highway is located approximately 6 miles north of the MBPA's northern boundary. U.S. 40/U.S. 191 extends east to Denver and west to Salt Lake City. It is the main east-west corridor for traffic from northern Colorado into Utah and serves as a route for tourist traffic to Dinosaur National Monument. U.S. 191 North also functions as a travelway for tourist traffic to Flaming Gorge National Recreation Area and other National Forest locations. U.S. 40/U.S. 191 provides access to the MBPA from the communities of Roosevelt, Duchesne, and Vernal, which would operate as the primary service centers for Project-related activity. No state highways or interstates exist to the south of the MBPA within 45 miles.

Traffic counts on U.S. 40/U.S. 191 can be fairly high, with higher traffic flows occurring during the summer tourist season. **Table 3.12.2.1-1** provides a summary of the average annual daily traffic (AADT) and percentage of the AADT associated with truck traffic on segments of U.S. 40/U.S. 191 that provide access to the MBPA. For 2011, the AADT counts along U.S. 40/U.S. 191 ranged from 5,435 vehicles per day near Duchesne to 27,205 vehicles per day in Vernal. In spite of increasing AADT counts, truck traffic showed a proportional decrease to the overall traffic on U.S. 40/U.S. 191 near the population centers of Duchesne and southern Roosevelt from 2005 to 2011. However, truck traffic on the stretch of highway serving Vernal increased from 19 percent to 37 percent from 2005 to 2011. All segments east of Roosevelt (U.S. 40/191 and 200 North Roosevelt) experienced increases in truck traffic during that same period. It should be noted that U.S. 40/U.S. 191 is used extensively by oil and gas field traffic.

Much of the traffic on these roads consists of oil tanker trucks that visit producing wells in the MBPA each day. These trucks travel approximately 140 miles one way to Salt Lake City, via U.S. 40 and Interstate 80. Additionally, production water tanker trucks as well as maintenance and passenger vehicles associated with oil and gas operational activities travel the MBPA roads each day. These vehicles generally travel locally to and from Vernal and Roosevelt.

Table 3.12.2.1-1. AADT and Percent Truck Traffic for U.S. 40/U.S. 191 Segments That Provide Access to the MBPA

Segment Name	2005 AADT	Percent Truck	2007 AADT	Percent Truck	2009 AADT	Percent Truck	2011 AADT	Percent Truck
22220 West Duchesne	5,205	37	5,660	37	5,555	40	5,900	34
State Route (SR) 87 Center Street Duchesne	4,995	40	7,190	40	7,270	40	7,770	31
East River Road Duchesne	5,060	42	5,030	42	5,085	40	5,435	28
12000 West Road to Bridgeland	5,455	44	5,490	43	5,730	46	5,865	25
Main Street Myton	5,550	46	6,570	46	6,640	45	7,545	22
B Street Myton	5,585	48	7,125	48	7,785	43	8,320	20
SR 87 Southwest of Roosevelt	8,390	13	10,370	20	9,220	20	8,340	16
2000 South Roosevelt	11,460	36	10,370	41	10,485	43	11,210	28
SR 121 SR 40 turns Right onto 200 North Roosevelt	10,010	34	14,895	39	15,055	44	16,090	35
Union Street Roosevelt	6,625	33	10,015	36	10,125	45	12,250	45
3500 East Ballard	6,130	31	7,580	36	7,660	39	9,395	41
7500 East Road to Fort Duchesne	5,835	24	7,290	24	7,365	33	8,090	39
SR 88 Road to Ouray	6,125	27	6,470	28	6,540	48	8,355	48
2500 West to Maeser	4,945	31	11,180	31	11,300	43	12,075	43
1500 West Vernal	21,345	35	22,235	34	21,540	39	20,940	39
SR 191 Vernal	27,735	19	28,895	19	27,990	37	27,205	37
500 South Vernal	13,240	22	13,585	27	13,330	34	14,085	34

AADT – average annual daily traffic
Source: UDOT (2005, 2007, 2009, 2011)

Crash statistics for Utah highways are available through the State Department of Highway Safety. **Table 3.12.2.1-2** provides a summary of crash statistics for both Duchesne and Uintah Counties from 2008 to 2010 – the most recent years for which data are available. Most of the vehicle crashes in both counties were property damage only (PDO) crashes. In Uintah County, the rate of fatal vehicle crashes has declined from 2008 to 2010. Fatal vehicle crash rates in Duchesne County have increased from 2008 to 2010. Injury vehicle crashes in both counties have generally decreased. When compared to statewide rates, injury vehicle crash rates in both counties were lower from 2008 to 2010. However, fatal vehicle crash rates were generally higher in both counties than those in the state.

Table 3.12.2.1-2. Crash History in Duchesne and Uintah Counties, 2008-2010

Year	County	PDO Crashes		Injury Crashes		Fatal Crashes		Total Crashes	
		Number	Rate*	Number	Rate*	Number	Rate*	Number	Rate*
2008	Duchesne	440	186.8	122	51.8	2	0.8	564	239.4
	Uintah	610	171.2	197	55.3	9	2.5	816	229.0
	State of Utah	38,997	150.7	17,125	66.2	245	0.9	56,367	217.8
2009	Duchesne	269	117.5	69	30.1	5	2.2	343	149.8
	Uintah	509	143.2	167	47.0	5	1.4	681	191.6
	State of Utah	35,398	135.0	15,752	60.1	217	0.8	51,367	195.9
2010	Duchesne	345	148.5	93	40.0	8	3.4	446	191.9
	Uintah	403	107.7	134	35.8	5	1.3	542	144.8
	State of Utah	34,155	128.3	14,995	56.3	218	0.8	49,368	185.5

PDO – property damage only
* Rate is per 100 million vehicle miles traveled
Source: UDOT (2008, 2009, 2010)

3.12.2.2 County Roads

Because the MBPA encompasses portions of Duchesne and Uintah Counties, county roads serve as the primary access routes from U.S. 40/U.S. 191 into the MBPA. **Table 3.12.2.2-1** provides a summary of the main county roads within the MBPA. The three county roads that would provide access to the MBPA include Pariette Road in Duchesne and Uintah Counties, Wells Draw Road in Duchesne County, and Sand Wash Road in Duchesne County.

Pariette Road would be the primary access road to the MBPA because it is the most direct route from U.S. 40/U.S. 191. Pariette Road intersects with U.S. 40/U.S. 191 just south of Myton, Utah, travels north/south into the MBPA, and eventually curves east. The road is paved from U.S. 40/U.S. 191 until it turns and traverses into Uintah County where it becomes Pariette Bench Road, a Class 1-B Gravel Road, though portions of the gravel roadway have been recently paved.

Wells Draw Road is a road that traverses 9.5 miles through the western portion of the MBPA. Approximately 2.5 miles southwest of the community of Myton, Wells Draw Road branches off Pariette Road. Once the road leaves the MBPA, it extends southerly to the Wrinkles Road, at which point it becomes Gate Canyon Road. Wells Draw Road has recently been paved and is one of the few stretches of paved road in the MBPA. It is anticipated that project traffic would only use the portion of Wells Draw Road that provides access to the proposed project within the MBPA; not the segment south of the MBPA that passes through BLM special designation areas and Special Recreation Management Areas (SRMAs). However, the primary access route to the MBPA would be through Pariette Road. Oil and gas trucks would travel to Vernal and Roosevelt to the north, where supporting road networks are adequate to carry trucks.

Sand Wash Road is also an important county road within the MBPA. It branches off Pariette Road approximately 5 miles from the northern border of the MBPA. Sand Wash Road runs in a generally southeasterly direction through the center of the MBPA for 6 miles, eventually ending at the Sandwash boat launch on the Green River.

Table 3.12.2.2-1. County Roads Providing Access to and within the MBPA

County	Road Name	Length Within the MBPA (miles)	Road Surface	ROW Width (feet)
Duchesne	Wells Draw Road	9.5	Paved	26
Duchesne/ Uintah	Sand Wash Road	6.0	Unpaved	18
Duchesne	Pariette Road	6.8	Paved/unpaved	30

In addition to the aforementioned county roads, numerous existing roads in the MBPA were built for farm and ranch access, recreation, oil and gas development, and mining. The majority of all county roads within the MBPA are unmaintained gravel roads and resource roads.

3.12.2.3 BLM System Roads

The majority of roads within the MBPA are part of the BLM transportation system. These roads include operator-maintained roads that service existing oil and gas development as well as BLM-maintained roads. Information on the extent and condition of the BLM roads within the MBPA is not available.

3.12.2.4 Right-of-Way and Road Maintenance Responsibility

As discussed in **Section 2.3.1.2**, the Proposed Action would require the construction or improvement of access roads to the proposed well sites. Approximately 363 miles of existing roads within the MBPA would require some level of ROW expansion and/or upgrades to accommodate increased oil and gas activity as well as to install pipeline and utility line corridors adjacent to the existing roads. In addition, approximately 243 miles of new access road would be constructed on BLM, state, and private surface lands.

A road network has been built incrementally within the MBPA to service ongoing oil and gas development. The BLM and oil and gas operators have developed this road network in conjunction with State and County road departments. UDOT currently maintains U.S. 40/U.S. 191. County Public Works Departments maintain several of the local roads in the MBPA vicinity, including the roads that are listed in **Table 3.12.2.2-1**. Well operators maintain roads that provide access to the MBPA well sites and facilities. Road maintenance on BLM roads are generally the responsibility of BLM.

3.12.2.5 Dust Control

As previously discussed, fugitive dust (which is created by traffic) is an issue on many of the primary transportation corridors in the MBPA. Current dust suppression techniques include the use of fresh water on BLM roads as well as access roads to well pads within the MBPA. As discussed in **Section 2.2.8.2**, approximately 1,000-bbls (0.13 acre-feet) of water would be needed annually for dust suppression per well pad, associated access road, and pipeline/utility corridor during project operations. On county roads within the MBPA, magnesium chloride has been used occasionally in the past for dust control when drilling rigs are being moved or the traffic volumes are higher. The exception would be to areas located within the potential habitat polygon for *S. wetlandicus* and *S. brevispinus*.

3.13 RECREATION

Opportunities for recreation exist within the MBPA. The majority of the lands within the MBPA fall under the jurisdiction of the BLM VFO. However, public lands within Uintah and Duchesne Counties also provide diverse recreational activities. Recreational activities within the MBPA include boating, fishing on the Green River, cultural tourism, OHV use, hunting, sightseeing and wildlife viewing, hiking, and dispersed camping. Recreation activities also occur in the Pariette Wetlands and Lower Green River Corridor ACECs, which are within or adjacent to the MBPA. **Section 3.15** discusses these areas in more detail.

3.13.1 Recreation Management

The primary goals and objectives for managing recreational resources on public lands are to ensure the continued availability of quality outdoor recreation opportunities and experiences that are not readily available from other sources. Based on its priorities for recreation and visitor services, the BLM has set forth three goals to which they are committed to following (BLM 2003b). They include:

- GOAL 1 - Improve Access to Appropriate Recreation Opportunities on Department of the Interior (DOI) Managed or Partnered Lands and Waters.
- GOAL 2 - Ensure a Quality Experience and Enjoyment of Natural and Cultural Resources on DOI Managed or Partnered Lands and Waters.
- GOAL 3 - Provide for and Receive Fair Value in Recreation.

The BLM manages recreational use of public lands through two different basic units of recreation management: the SRMA and the Extensive Recreation Management Area (ERMA). An SRMA is an area where recreation is emphasized. SRMAs are defined as areas that require a recreation investment, where more intensive recreation management is needed and where recreation is a principal management objective (BLM 2005b). **Figure 3.13.1-1 (Attachment 1)** shows the SRMAs in the vicinity of the MBPA. No SRMAs exist within the MBPA. ERMAs are defined as areas where dispersed recreation is encouraged and where visitors have recreational freedom-of-choice with minimal regulatory constraints. They are usually areas that receive very little recreation use. These areas could include developed and primitive recreation sites with minimal facilities. Public recreation issues or management concerns are limited, and minimal management suffices in these areas.

Within an ERMA, recreation is generally unstructured and dispersed, requires minimal recreation-related investments, and has minimal regulatory constraints (BLM 2008b). Detailed planning is not usually required for these areas. All BLM areas that are not part of a SRMA are included within an ERMA. The MBPA is managed as an ERMA, and recreation is managed by recreation type rather than specific type of experience and activity.

3.13.2 Recreation Use In ERMAs

Areas within the vicinity of the MBPA are managed as part of the Vernal ERMA for dispersed recreation uses that require minimal facility development. Within the MBPA, all BLM acres are managed as part of the ERMA. Roads of varying quality traverse the ERMA and provide access for a variety of uses, including oil and gas development and production, livestock grazing, and other public land uses. In addition, these roads provide access to recreation destinations such as the Green River.

Oil and gas development has left its mark on the land through well pads, pipelines, compressor stations, roads, and power lines. **Section 3.14** discusses existing visual resource conditions. In addition, oil and gas drilling and production activities with associated truck traffic represent the majority of the noise disturbances in the vicinity of and within the MBPA. Noise levels are elevated near well pad and access road construction, drilling rigs, and along access roads. Both visual resource and noise impacts associated with oil and gas development would have impacts on recreational uses of the MBPA. However, while the landscape exhibits a presence of human development, it still retains some of its original basic character.

3.13.2.1 Recreation Types

The BLM manages various recreational opportunities and facilities on its lands. Examples of these opportunities and facilities include:

- Trails
- OHV recreation
- Hunting and wildlife viewing
- Scenic drives
- River recreation (including boating and swimming) on the Green and White Rivers
- Educational/cultural tourism
- Pariette Wetlands ecological field trips

The ERMA setting provides opportunities for a variety of motorized and non-motorized recreation activities. Motorized activities include backcountry driving and vehicle-supported camping, picnicking, fishing, wildlife viewing and sightseeing. Non-motorized activities include hiking, mountain biking, hunting, river floating, fishing, and wildlife viewing. No future new recreational sites are anticipated within the MBPA.

3.13.2.2 Off-Highway Vehicles

The BLM developed the 2001 *National Management Strategy for Motorized Off-Highway Vehicle Use on Public Lands* (OHV Strategy) to assist field managers in the implementation of on-the-ground solutions for OHV recreation and access issues, to protect public land resources, and to make more efficient use of existing staff and funding. The OHV Strategy is an effort to manage motorized OHV activities in full compliance with EOs 11644 (1972) and 11989 (1978) as well as 43 CFR 8340, which in part, requires the BLM to assign designations to areas and trails to establish control over OHV use and operation. These designations are incorporated in BLM 8340 Manual and are defined as follows:

- **Open:** The BLM designates areas as “open” for intensive OHV use where there are no compelling resources protection needs, user conflicts, or public safety issues to warrant limiting cross-country travel.
- **Limited:** The agency designates areas as “limited” where it must restrict OHV use to meet specific resource management objectives. These limitations may include: restricting the number or types of vehicles; limiting the time or season of use; issuing permitted or licensed use only; limiting use to existing roads and trails; and limiting use to designated roads and trails. The BLM

may place other limitations on use to protect resources, as needed. Limitations specifically apply in areas where motorized OHV enthusiasts ride intensely or participate in competitive events.

- **Closed:** The BLM designates areas as "closed" if closures to all vehicular use are necessary to protect resources, ensure visitor safety, or reduce use conflicts (BLM 2006d).

The use of OHVs around the MBPA will likely continue to increase as new trails are officially identified and the State of Utah continues to promote OHV recreation on public lands. According to the Utah Department of Motor Vehicles (UDMV), the number of statewide OHV registrations steadily increased from approximately 169,000 in 2004 (UDMV 2005) to more than 214,000 in 2007 (UDMV 2008). Starting in 2008, the number of statewide OHV registrations has been fluctuating with 187,781 current registrations in Utah (UDMV 2013). 2013 current OHV registrations total 4,995 in Uintah County and 2,809 in Duchesne County (UDMV 2013). OHV use in the MBPA is limited to designated travel routes. **Figure 3.13.2.2-1 (Attachment 1)** illustrates the OHV areas in the MBPA vicinity.

3.13.2.3 Hunting and Wildlife Viewing

Recreation uses within the MBPA are concentrated during the hunting seasons. The MBPA provides antelope as well as some mule deer and elk hunting opportunities. Pronghorn hunting in the area generally occurs during September, with the mule deer and elk hunting season taking place in October. The area also attracts some small game hunters who want to pursue rabbits and upland game birds.

Aside from big game and upland game hunting, low levels of waterfowl hunting also occur in and adjacent to the MBPA. On the opening weekend of waterfowl season, 10 to 35 hunters can be found at the Pariette Wetlands pursuing ducks and geese in and adjacent to the southeastern corner of the MBPA. On subsequent weekends throughout the season, hunters trickle onto the area (see **Section 3.13.2.5**). Waterfowl hunters are generally not found in any other parts of the MBPA. The Pariette Wetlands are also popular with bird watchers because a number of rare migrants are known to occur in the area.

3.13.2.4 River Recreation

Portions of the Green River are popular among river rafters, kayakers, and shore fishermen. The boating season on the Green River runs from approximately March 15 to November 15. Commercial outfitters typically run most of their trips between the Memorial Day and Labor Day holidays each year.

The 84-mile Desolation Canyon portion of the Green River begins at the Sand Wash put-in (boat launch), located approximately 9 miles south of the MBPA. This portion of the Green River is proposed for Wild and Scenic River (WSR) status (see **Section 3.15**). Launches at Desolation Canyon occur from May 1 to September 30. Launch dates prior to May 1 and after September 30 are available on a first-come basis. A permit is required year-round to run Desolation Canyon. The Desolation Canyon section is very popular with rafters and kayakers, an indication of which is that more than 12 commercial guide companies run trips out of the Sand Wash put-in (BLM 2007c). Located in the vicinity of the put-in, the remote Sand Wash Ranger Station is accessed through a series of dirt roads. A campground is located at Sand Wash and is typically used by river runners prior to launch. As with the put-in, the Sand Wash Ranger Station is located approximately 9 miles south of the MBPA. Approximately 2 miles of the MBPA eastern boundary is adjacent to the Green River, upstream of the Sand Wash put-in. Though this stretch of river is occasionally used by boaters and fishermen, recreational use is not nearly as frequent as what occurs in Desolation Canyon below the Sand Wash put-in. Put-ins are located outside the MBPA; consequently, no put-ins exist within the Green River segment adjacent to the MBPA.

3.13.2.5 Wetland Recreation

The Pariette Wetlands ACEC is approximately 10,437 acres in size and is situated in the northeastern corner of the MBPA. This ACEC encompassess a portion of Pariette Draw, located approximately 24 miles southwest of Vernal, Utah (BLM 2007d, BLM 2008b). The Pariette Wetlands Complex comprises 9,033 acres within the ACEC; of these 9,033 acres, 2,529 acres are classified as wetland or riparian habitat. It is the largest BLM wetland development in Utah (BLM 2012f).

Prior to 1972, the perennial creek running through Pariette Draw fanned out near its confluence with the Green River into a small area of wetlands and riparian habitat. Recognizing an opportunity to increase waterfowl production and seasonal habitat in the desert region of the Uinta Basin, BLM wildlife biologists dug a series of 23 gravity-fed ponds between 1972 and 1975 (Utah Travel Industry 2007) to create the wetlands. To date, the completed Pariette Wetlands Complex supports more than 1,800 ducks and 100 geese during spring and fall migration each year, more than 100 documented species of birds, and numerous species of other wildlife such as deer, elk, bear, and mountain lion (Darren Williams, e-mail 2013).

The BLM manages Pariette Wetlands for waterfowl habitat and for recreational pursuits of hunting, bird watching and fishing. According to the BLM VFO, most visitors arrive on the opening weekend of waterfowl hunting season, at which time the wetland experiences approximately 60 to 70 visitor days and approximately 10 to 35 hunters during the waterfowl hunting season. Hunting activities decline substantially over the remainder of the season with an average of 5 to 10 hunters during other hunting seasons (Darren Williams, e-mail 2013). Approximately a dozen bird watchers visit the wetlands each spring; another dozen return to observe fall migration of shorebirds and waterfowl. The occasional group of deer and antelope hunters uses the uplands surrounding the Pariette Wetlands each year.

The BLM encourages visitation by providing directions to the site, road conditions, options for group tours, and hunting and fishing regulations. In total, an estimated 200+ people visit the site each year using the partially-graveled dirt roads leading from Fort Duchesne and Myton (Darren Williams, e-mail 2013).

3.13.2.6 Hiking

Hiking is infrequent within the MBPA because relatively few attractions are available for hikers. However, the Pariette Wetlands ACEC contains an interpretive trail system available to hikers. The trail system winds through many of the ponds in the ACEC. Besides hiking, these trails also provide access for hunters, bird watchers, research professionals, school children, general recreationists, employees, and volunteers.

3.13.2.7 Scenic Drives

Wells Draw Road traverses approximately 8 miles of the western portion of the MBPA and is classified as a State road (see **Figure 3.12.2-1 – Attachment 1**). Constructed in 1866 as a primary supply and communications line between Fort Duchesne and Price, this road offers numerous recreational opportunities including driving, biking, hiking, and access to historic sites. The road is listed as both a State Scenic Byway and a County Scenic Road through the Wells Draw and Gate Canyon areas as well as a BLM Back Country Byway. An interpretive sign shows the locations of petroglyphs, pictographs, and historic sites along the road. However, these sites are located in the Nine Mile Canyon portion of the byway, approximately 20 miles southwest of the MBPA. No specially designated sites are located along

Wells Draw Road through the MBPA. One (1) interpretive sign is presently located within the MBPA, more specifically, in Section 5, Township 9 South, Range 16 East.

3.14 VISUAL RESOURCES

The BLM's current management objective for visual resources is to manage public lands in such a way as to preserve those scenic vistas deemed to be most important 1) in their impact on the quality of life for residents and communities in the areas, 2) in their contribution to the quality of recreational visitor experiences, and 3) in supporting the regional tourism industry and segments of the local economy that depend on public land resources. Another objective is to seek to complement the rural, agricultural, historic, and urban landscapes on adjoining private, state, and tribal surface lands by maintaining the integrity of background vistas on public lands (BLM 2008b).

3.14.1 General Visual Characteristics of the MBPA

The MBPA lies within the Uinta Basin of the Colorado Plateau Physiographic Province. The province is characterized by extensive vistas, plateaus, buttes, mesas, and deeply-incised canyons that expose flat-lying or gently warped strata. The general visual characteristics of the Uinta Basin topography west of the Green River can be described as relatively flat with wide, shallow valleys not more than a few hundred feet below the surrounding country (Stokes 1986). The landscape is composed of scenery that is typical of the central Uinta Basin: a predominance of shallow, gently rolling hills and drainages; shale-colored bluffs and steeply incised drainages in the vicinity of the Green River and Nine Mile Canyon; and distant views of the Uinta Mountains to the north, the Roan Cliffs and Book Cliffs to the south, and the Wasatch foothills to the west.

The MBPA is predominantly desert scrub and sagebrush, with numerous draws and canyons that may contain riparian bottomlands. The area appears vast and open before dropping off towards the Green River floodplain in the southeastern portion of the MBPA, where riparian vegetation blocks the far view. **Section 3.7** discusses resident vegetation in the MBPA in more detail. Views available from the MBPA include the Green River riparian area to the southeast and east, butte lands to the northeast, agricultural and semi-developed areas to the north, and desert scrublands to the south and west.

No human habitation is present within the MBPA. UDOGM oil and gas datasets estimate approximately 2,363 oil wells and 106 gas wells within the MBPA (Utah AGRC 2013). **Figure 2.3-1** shows active, inactive, and future UDOGM wells that occur within the MBPA boundary, including well statuses and well counts. The placement of oil and gas wells is most prevalent in the northern and central portion of the MBPA, with some well placement occurring in the southern portion. In the vicinity of the wells, access roads, pump jacks, storage tanks, and aboveground pipelines are a prominent part of the viewscape. The majority of the aboveground equipment at existing well sites is painted Desert Tan in color so as to better blend with the surrounding landscape. However, areas along the southern boundary of the MBPA and in the vicinity of the Green River are mostly undeveloped and exhibit a natural landscape.

3.14.2 Visual Resource Management System

The BLM is responsible for identifying and protecting scenic values on public lands under several provisions of NEPA and FLPMA. The Visual Resource Management (VRM) system was developed to ensure that visual resources on BLM-managed lands are inventoried and protected in a systematic, interdisciplinary manner. The VRM system provides a methodology to inventory existing scenic quality; to assign visual resource inventory classes based on a combination of scenic values, visual sensitivity, and view distances; and to assign visual management objectives. The VRM system also includes a contrast rating procedure for evaluating the potential visual consequences of a proposed project or management activity. It provides a basic approach for evaluating direct visual impacts and potential cumulative visual impacts of the proposed project.

The VRM system has established four visual resource classes to serve not only as an inventory tool that represents the relative value of existing visual resources, but also as a management tool that defines visual management objectives for the respective classified lands. A VRM class is based on the physical and sociological characteristics of a given homogenous area and serves as a visual management standard. **Table 3.14.2-1** describes the VRM classes and their objectives.

Table 3.14.2-1. VRM Classes and Objectives

VRM Class	Objective
I	To preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
II	To retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
III	To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
IV	To provide for management activities that require major modification to the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Source: BLM 2008b

3.14.3 Visual Resource Management in the MBPA

The BLM VFO has visually inventoried and applied the VRM system to all public lands under its jurisdiction within the MBPA, with the overall objective being to minimize impacts to visual resources resulting from human activities. The Vernal RMP has designated areas within the MBPA as VRM Class II-IV. **Figure 3.14.3-1 (Attachment 1)** shows the VRM classes within the MBPA. Existing and proposed oil and gas development occurs within each of these designations. **Table 3.14.3-1** summarizes the acreage for each VRM class within the MBPA.

Table 3.14.3-1. Acreage within the MBPA by VRM Class

VRM Class	Acreage
Class I	0
Class II	386
Class III	20,838
Class IV	82,672
Total	**103,896**

Approximately 79.6 percent of the MBPA is designated as VRM Class IV, which allows major modifications to the existing character of the landscape. The Pariette Wetlands area in the northeastern portion of the MBPA and the Wells Draw Road corridor in the western portion of the MBPA are designated as VRM Class III. The level of change to the characteristic landscape for Class III should be moderate. The Green River Corridor, which lies in the southeastern portion of the MBPA, is designated as VRM Class II, where the level of change to the characteristic landscape should be low.

Visual sensitivity generally is a function of the number of people that will view the landscape, the duration of their views, their proximity to the landscape, and the reason they are in a position to observe the views. There are visitors that are drawn to portions of the MBPA that may be considered visually pleasing. Public views of the MBPA would be from public travel routes and recreational use areas within the vicinity. Visually sensitive portions of the MBPA include those areas that are visible from the Pariette Wetlands overlook, approximately 0.5 mile east of the MBPA, and the Green River Corridor, adjacent to the southeastern portion of the MBPA.

Existing land uses within the MBPA that could potentially cause visual intrusions and have an impact on scenic quality include surface-disturbing activities such as oil and natural gas exploration and development, OHV use, trail and/or road development, livestock grazing and rangeland management activities, and agricultural operations. Oil and gas wells are present throughout the northern and central portion of the MBPA. Agricultural operations are located along the northern boundary of the MBPA, near Pariette Draw. Most road development in the MBPA is associated with oil and gas well installations.

Within a one-mile corridor on either side of Wells Draw Road within the MBPA boundary, 216 well pads (with 286 existing wells and 11 plugged and abandoned wells) can be found. Of the 216 total well pads within this corridor, 200 are located in areas designated as VRM Class III, and the remainder are in VRM Class IV areas. There are 262 existing wells in the VRM Class III areas and 10 plugged and abandoned wells.

3.14.4 Visual Resource Inventory

The following description of the BLM's 2011 Visual Resource Inventory process was taken from Logan Simpson Design (2011). The visual resource inventory (VRI) process establishes VRI classes, which are used to assess visual values for resource management plans (RMPs). Visual management objectives are developed through the BLM's resource management planning process and reflect the resource-allocation decisions made in the RMP. According to BLM Manual H-1601-1, Land Use Planning, implementation decisions must be designed to achieve VRM objectives within each VRM class. VRM classes may reflect VRI classes, but they may not necessarily do so since management objectives for other resources as determined in the planning process may require different visual management needs. The inventories serve as the baseline information for assessing potential effects to visual resources of by proposed projects. The BLM's VRM system was used to inventory and classify the scenic (visual) resources for the analysis area. The inventory identified the scenic quality, sensitivity levels, and distance zones and then determined VRI classes, according to the VRM manual, for use as baseline information for describing impacts to the visual landscape.

BLM defines scenic quality as the measure of the visual appeal of the landscape. The BLM's VRI process is based on the assumption that while all lands have some level of scenic value, the areas with the greatest variety and most harmonious composition have the greatest scenic value. Although scenic quality is evaluated in relation to the natural landscape, this does not mean that human-made features necessarily detract from the scenic value of a landscape. In fact, human-made features may actually enhance the scenic value.

In the inventory process the landscape is divided into areas that have generally similar characteristics based on the key factors, especially the landform, vegetation and sometimes water. These areas are called Scenic Quality Rating Units (SQRU). Each unit is subsequently described in terms of its landscape character elements of form, line color, and texture and evaluated for all seven key factors. The factors are scored according to a scale of 1 to 5 for most factors, although a Cultural Modifications factor can have a negative impact on the SQRU.

The Scenic Quality Rating is the result of totaling the scores of the seven analysis factors on the Scenic Quality Field Inventory (SQFI) rating form and assigning the rating based on points according to the following schedule:

- Class A = a score of 19 points or more
- Class B = a score of 12 to 18 points
- Class C = a score of 11 points or less

The scenic quality field inventory was conducted in June 2011. The process began with an inventory team meeting, which included a group of approximately 6-8 interdisciplinary staff members from the BLM's VFO. The meeting began with a review of the BLM's VRI process as described in Manual H-8410-1, after which inventory observation points (IOPs) and travel plans were discussed. In the process of planning IOPs and travel routes, SQRU boundaries were revised in some areas based on discussions with BLM staff most familiar with each area.

BLM staff planned the preliminary locations of IOPs using both BLM Surface Management Status topographic maps and the SQRU field maps. While a variety of factors, including traffic volume, accessibility, and logistical viewpoint locations were considered, the IOPs were primarily selected based on providing a good location to capture a view of the characteristic landscape of the SQRUs. The IOPs were marked on the maps and travel routes to each of the points were then highlighted.

An in-field calibration exercises performed in which the teams collectively evaluated a selected SQRU to ensure that the inventory teams would be using similar criteria and terminology to evaluate the landscape in their respective inventory areas. Together, they filled out an example rating form and discussed the intricacies of the inventory system and form. They discussed key terms from the BLM's list of suggested vocabulary and then determined, to the extent possible, the terms that would be most relevant to the physiographic provinces.

The inventory teams then split into their planned areas and traveled their planned routes throughout the Vernal Field Office. Each team was joined by at least one representative from the BLM VFO. IOPs for the units were primarily determined as the team traveled through the units and depended on where the best viewing area could be photographed, although some viewpoints had been predetermined by the field office staff. Each team recorded the views from the IOPs with a GPS-enabled digital camera, which recorded geographical locations (latitude and longitude) for each photo.

During in-field inventory of each SQRU, the teams reviewed the preliminary delineations and sketched, as necessary, proposed changes to the boundaries on the field maps. The field revisions resulted in a total of 83 SQRUs as the preliminary units were split and/or combined along with the boundary adjustments. The MBPA occurs in the Pariette Bench and Castle Peak Pinnacle Units. The teams also completed BLM SQFI rating forms (Form 8400-1, BLM Manual H-8410-1) for each SQRU In the first step of evaluating each SQRU, landscape character was defined in terms of form, line, color, and texture, as described below and as exemplified in Illustrations 4, 5, 6, and 7 in BLM Manual H-8410-1:

- Form: The mass or shape of an object, or of objects that appear unified.
- Line: The path, real or imagined, that the eye follows when perceiving abrupt differences in form, color, or texture or when objects are aligned in a one-dimensional sequence. Usually evident as the edge of shapes or masses in the landscape.
- Color: The property of reflecting light of a particular intensity and wavelength (or mixture of wavelengths) to which the eye is sensitive. It is the major visual property of surfaces.
- Texture: The aggregation of small forms or color mixtures into a continuous surface pattern; the aggregated parts are enough that they do not appear as discrete objects in the composition of a scene.

The second step included identifying general comments about the character, land use or other aspects of the SQRU in the narrative section of the field inventory form. To gain a better perspective of the overall character of each SQRU, the SQRUs were later reviewed using GIS programs. Additional notes from this review were added to the inventory forms, and all notes were then summarized for the geodatabase in paragraph form.

In the final step, scores were recorded for each of the seven key factors of the landscape within the SQRU according to the scale for each factor as described in the Scenic Quality Inventory and Evaluation Chart. The scores were then totaled, and a scenic quality classification of A, B, or C was determined using the numeric scale on the SQFI rating form (Logan Simpson Design 2011).

The Pariette Bench Unit and Castle Peak Units received Scenic Quality Ratings of C.

3.15 SPECIAL DESIGNATIONS

Special management areas are congressionally and administratively designated areas that include ACECs and WSRs.

3.15.1 ACECs

An ACEC is defined in FLPMA, Public Law 94-579, Section 103(a), as a designation that highlights areas where special management attention is needed to protect and prevent irreparable damage to important historic, cultural, and scenic values; fish and wildlife resources or other natural systems or processes; or to protect human life and safety from natural hazards. BLM establishes special management measures for these areas through land use planning. The designation is a record of relevant and important values that must be accommodated when BLM considersfuture management actions and land use proposals (BLM 2012d). ACECs differ from other special designations in that the designation by itself does not automatically prohibit or restrict other uses in the area. The management of ACECs is focused on the resource or natural hazard of concern and varies considerably from area to area.

To be considered for designation as an ACEC, an area must meet the requirements of relevance and importance as described in the Code of Federal Regulations (43 CFR 1610.7.2). The definitions for relevance and importance are as follows:

Relevance: An area is considered relevant if it contains one or more of the following:

- A significant historic, cultural, or scenic value (for example rare or sensitive archaeological resources and religious or cultural resources important to Native Americans).
- A fish or wildlife resource (for example habitat for endangered, sensitive, or threatened species, or habitat essential for maintaining species diversity).
- A natural process or system (for example endangered, sensitive, or threatened plant species; rare, endemic, or relict plants or plant communities; rare geologic features).
- A natural hazard (for example areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs). A hazard caused by human action may meet the relevance criteria if it is determined through the RMP process that it has become part of the natural process.

Importance: The value, resource, system, process, or hazard described above must have substantial significance to satisfy the importance criteria. This generally means it is characterized by one or more of the following:

- Has more than locally significant qualities which give it special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource.
- Has qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.
- Has been recognized as warranting protection in order to satisfy national priority concerns or to carry out the mandates of the FLPMA.
- Has qualities that warrant highlighting in order to satisfy public or management concerns about safety and public welfare.
- Poses a significant threat to human life and safety or to property.

The Vernal RMP (page 119) states that areas are to be designated and managed as ACECs where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values; fish and wildlife resources; or other natural system or processes, or to protect life and safety from natural hazards.

The MBPA is partially within two ACECs: the Pariette Wetlands ACEC and the Lower Green River Corridor ACEC. **Figure 3.15-1 (Attachment 1)** indicates the location of these two ACECs. The management decisions for the ACECs are listed in the Vernal ROD and Approved RMP (BLM 2008b).

3.15.1.1 Pariette Wetlands ACEC

The total size of the Pariette Wetlands ACEC is approximately 10,437 acres (see **Section 3.13.2.5**). It is comprised of a wetland ecosystem that contains approximately 980 acres of riparian habitat, 516 acres of ponds that provide open-water waterfowl habitat, and 1,033 acres of other wetland habitat. The ACEC contains special status bird and plant species, including a considerable population of the federally listed threatened plant species Pariette cactus (*S. brevispinus*) and Uinta Basin hookless cactus (*S. wetlandicus*). The presence of special status bird and plant habitat and of the wetlands ecosystem meets the relevance and importance criteria of ACECs, per Appendix G of the Vernal RMP.

Approximately 7,216 acres of the ACEC are within the core conservation areas of the Uinta Basin hookless cacti, and 333 acres are within the core conservation area of the Pariette cacti. The purpose of the proposed core conservation areas and management recommendations is to protect the most important populations or sub-populations, and reduce threats to both *Sclerocactus* species. Two levels of core conservation areas were developed based on pollinator travel distance and habitat connectivity between populations and individuals. **Section 3.10.1.2.1** discusses the management areas for both *Sclerocactus* species.

According to the Vernal RMP, the primary management objective for the Pariette Wetlands ACEC is to protect the relevant and important special status bird and plant habitat as well as wetlands ecosystem values, waterfowl production, and soil (BLM 2008b). The BLM's management decisions for the Pariette Wetlands ACEC emphasize seasonal and surface occupancy restrictions for protection of wildlife and plant species, protection of floodplains and erosive soils, and the management of vegetation to benefit riparian and watershed values. The management decision for the Pariette Wetlands ACEC is found in Section E of the Vernal Approved RMP (BLM 2008b).

The Pariette Wetlands ACEC encompasses approximately 10,312 acres in the northern and eastern portions of the MBPA. The ACEC was designated after the majority of its land area had been leased for oil and gas development. Consequently, 36 producing oil and gas wells with associated access roads and utilities are currently present within the boundary of the Pariette Wetlands ACEC (Utah AGRC 2013). Of the 36 producing wells that are currently present within the boundary of the Pariette Wetlands ACEC, 35 fall within the "Existing Development" vegetation community and one falls within "Agricultural Lands" vegetation community.

Under Management Decision ACEC-11 of the Vernal RMP, Pariette Wetlands will continue to be designated as an ACEC. A comprehensive integrated activity plan will be developed/implemented that will address protection of special status bird and plant species and habitat, wetlands ecosystem, waterfowl production, and soil. OHV use will be limited to designated routes. Visual resources will be managed as Class III. For oil and gas leasing within Pariette Wetlands:

- Zero acres will be open to leasing subject to the terms and conditions of the standard lease form.
- Zero acres will be open to leasing subject to moderate constraints such as timing limitations and Controlled Surface Use.

- About 10,437 acres will be open to leasing subject to major constraints such as No Surface Occupancy stipulations.
- Zero acres will be unavailable for leasing.

3.15.1.2 Lower Green River Corridor ACEC

The total size of the Lower Green River Corridor ACEC is approximately 8,657 acres. It contains significant riparian habitat, special status plant, fish, wildlife species habitat, and high-quality scenic values. The riparian habitat and scenic values meet the relevance and importance criteria, per Appendix G of the Vernal RMP. The Lower Green River Corridor ACEC contains approximately 1,338 acres of riparian habitat. It encompasses 8,207 acres within the USFWS potential habitat polygon of the Uinta Basin hookless cactus, and 662 acres within 0.5 mile of known raptor nests. Approximately 30 miles of the Green River with wild and scenic qualities overlap with the Lower Green River Corridor ACEC (see **Section 3.15.3** below).

According to the Vernal RMP, the primary management objective for the Lower Green River Corridor ACEC is to protect relevant and important riparian habitat and scenic values (BLM 2008b). The ACEC management decisions for the area emphasize the protection of riparian and special status species through seasonal and surface occupancy restrictions and the protection of the Green River viewshed VRM II. The management decisions for the Lower Green River Corridor ACEC can be found in Section E of the Vernal RMP (BLM 2008b).

The Lower Green River Corridor ACEC encompasses 134 acres of the MBPA that are adjacent to the Green River. The 2008 Vernal RMP restricts surface occupancy for leasable materials on all 8,657 acres of the Lower Green River Corridor ACEC to protect the listed management objectives for the ACEC.

Under Management Decision ACEC-6 of the Vernal RMP, the Lower Green River Corridor will continue to be designated as an ACEC. No Surface Occupancy (NSO) will be allowed within line of sight or up to one-half mile from the centerline of the river, whichever is less. OHV use will be limited to designated routes. Visual resources will be managed as Class II. For oil and gas leasing within the Lower Green River Corridor:

- Zero acres will be open to leasing subject to the terms and conditions of the standardlease form.
- Zero acres will be open to leasing subject to moderate constraints such as TLs andCSU.
- Approximately 8,470 acres will be open to leasing subject to major constraints such as NSO stipulations.
- Zero acres will be unavailable for leasing.

3.15.2 Wild and Scenic Rivers

The Wild and Scenic Rivers Act (Public Law 90-524) is designed to preserve free-flowing rivers with outstandingly remarkable values (ORVs) in their natural condition for the benefit of present and future generations, balancing the nation's water resource development policies with river conservation and recreational goals. The evaluation of rivers for potential designation into the National Wild and Scenic Rivers System (NWSRS) is a three-step process: 1) determine the river's eligibility, 2) assign a tentative classification, and 3) determine suitability for final designation. Rivers can be designated into the national system by an act of Congress or by the Secretary of the Interior at the request of a State governor.

To be eligible, a river must be free flowing. The Wild and Scenic Rivers Act defines “free-flowing” as any river or section of river, existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, with shorelines or watersheds still largely primitive and shorelines largely undeveloped. However, minor structures existing at the time any river is proposed for inclusion in the NWSRS will not automatically bar its consideration from such inclusion, provided that it will not be construed to authorize, intend, or encourage future construction of such structures within components of the NWSRS.

Another screening criterion to determine if a river segment may be eligible for inclusion in the NWSRS is that the river must possess at least one “outstandingly remarkable value” (ORV). An ORV is a unique, rare, or exemplary feature of a river that is significant at a comparative regional or national level. The value may be scenic, recreational, geological, fish-related, wildlife-related, historic, cultural, botanical, hydrological, paleontological, scientific or other value (BLM 2008c). For the Lower Green River, recreational use and fish habitat are the outstanding remarkable values, as identified in Appendix G of the Vernal RMP.

The MBPA borders a segment of the Green River that BLM has proposed for Wild and Scenic River (WSR) designation. **Figure 3.15-1** indicates the location of the proposed WSR area. The management decisions for the Green River segment are listed in the Vernal ROD and Approved RMP (BLM 2008b). Under Management Decision WSR-1, the BLM will continue to manage previously recommended segments of the Upper Green and Lower Green Rivers to protect their outstandingly remarkable values and the tentative scenic classification until such time that a designation decision is made.

3.15.3 Suitable Lower Green River Wild and Scenic River

The total size of the Lower Green River WSR area is approximately 11,968 acres. The Vernal RMP carried forward the Lower Green River along the eastern boundary of the MBPA as suitable for inclusion in the NWSRS (BLM 2008b). The 2008 Vernal RMP has tentatively classified the Lower Green River as “Scenic.” The BLM currently manages about 27 miles of shoreline out of a total of 30 shoreline miles along the river. The Lower Green River WSR encompasses 286 acres of the extreme southeast portion of the MBPA.

The BLM is required to manage the Lower Green River as suitable WSR to protect its free-flowing nature, ORVs, and tentative classification within a corridor measuring 0.25 mile from the high water mark on each side of the river bank. The Lower Green River would be managed to protect recreational use and fish habitat, which are the outstanding remarkable values identified in the Vernal RMP. The Vernal RMP places an NSO stipulation on areas within 0.5 mile or line of sight of the centerline of the river, whichever is less.

3.16 SOCIOECONOMICS

The primary geographic areas of analysis to evaluate the potential socioeconomic effects of the proposed project are Duchesne County, Uintah County, and the State of Utah. This section characterizes the socioeconomic conditions of the economy and population, housing resources, community services, and selected local and State revenues. This section also describes socioeconomic conditions of the Northern Ute Indian Tribe, whose reservation is adjacent to the MBPA.

3.16.1 Population, Housing, and Demographics

The Demographic and Economic Analysis (DEA) section of the Governor's Office of Planning and Budget in Utah is responsible for managing, analyzing, and disseminating economic, demographic, and fiscal data. The DEA not only estimates population levels and characteristics but also projects long-term economic and demographic trends.

Table 3.16.1-1 provides population data for the two counties within the MBPA, along with the State of Utah and U.S. population data. Overall, population in the two-county region increased from a combined population of 39,694 in 2000 to 51,195 in 2010, which represents an increase of approximately 29 percent. According to the Utah Population Estimates Committee, the population growth rate for Duchesne County from 2008 to 2009 was 3.6 percent – the highest growth rate among Utah counties. The growth rate for Uintah County during the same period was 2.8 percent, the fourth highest rate in the state. By comparison, the population growth rate for the State of Utah from 2008 to 2009 was 1.5 percent (GOPB 2009). Growth in Duchesne and Uintah counties can be primarily attributed to the natural resources and mining industry, which includes oil and gas extraction, metal mines, coal mines, sand and gravel, and non-metal mines.

In terms of racial composition, approximately 89.2 percent of the Duchesne County population is white and 4.5 percent is American Indian/Alaska Native. Nearly 6.0 percent of the population in Duchesne County is Hispanic, an ethnicity that covers several racial categories. In Uintah County, approximately 86.6 percent of its population is white, and 7.7 percent is American Indian/Alaska Native. About 7.1 percent of the population in Uintah County is Hispanic (U.S. Census Bureau 2010).

Table 3.16.1-1. Population Data

Location	Population[1]		Change in Population 2000-2010	Projected Population[2]	
	2000	2010		2020	2030
Uintah County	25,297	32,588	+29.2%	37,950	40,638
Duchesne County	14,397	18,607	+29.5%	20,130	21,533
State of Utah	2,246,553	2,763,885	+23.8%	3,652,547	4,387,831
United States	281,421,906	308,745,538	+9.7%	341,387,000	373,504,000

[1] U.S. Census Bureau 2010a
[2] 2008 Baseline Projections, Utah Governor's Office of Planning and Budget; U.S. projected population from 2008 National Population Projections, U.S. Census Bureau

Table 3.16.1-2 summarizes key demographic statistics. In 2010, an estimated 18,349 housing units were available for use by residents in the two counties, and 21,332 persons were employed in the labor force. A key statistic presented in this table is the Employment/Housing Ratio, more commonly known as the "jobs-housing balance." The balance between jobs and housing is the relationship between the number of people employed in an area versus the potential housing opportunities that currently exist in that same area. A common target for the jobs-housing balance ratio is 1.5 employees for every housing unit, with a recommended range from 1.3 to 1.7 employees per housing unit (Weitz 2003). A ratio above this range indicates that there are more jobs than available housing, which implies that employees are commuting from outside the area into the community for work. Conversely, a ratio below this range indicates that there is more housing than available jobs, which may show that employees are commuting from the community to outside employment. In both situations, additional traffic would be generated along with its associated environmental impacts. Based on information from the U.S. Census Bureau, the ratio of employees to the potential housing opportunities in Uintah and Duchesne Counties were 1.16 employees for every housing unit in 2010.

Table 3.16.1-2. Demographic Characteristics of the MBPA, 2010

County	Housing Units[1]	Employment[2]	Individuals per Household[1]	Employment/ Housing Ratio
Uintah County	11,659	14,091	3.07	1.21
Duchesne County	6,690	7,241	3.05	1.08
Total	**18,349**	**21,332**	**-**	**1.16**

[1] U.S. Census Bureau 2010. Housing units for seasonal, recreational, or occasional are excluded.
[2] U.S. Census Bureau, Selected Economic Characteristics, 2006-2010 American Community Survey 5-Year Estimates. Includes employed persons 16 years of age and older.

3.16.2 Employment and Income

Table 3.16.2-1 provides a breakdown of non-agricultural job sources in Duchesne and Uintah Counties by employment sector. The economies of both counties are largely based on natural resources and mining. Other industries that bring revenue into these counties include trade, transportation, utilities and government.

Table 3.16.2-1. Non-Agricultural Job Sources in Duchesne and Uintah Counties by Employment Sector, 2010

Employment Sector	Duchesne County		Uintah County	
	Jobs	% Total	Jobs	% Total
Natural Resources and Mining	1,510	20.6	2,627	19.8
Construction	523	7.1	957	7.2
Manufacturing	170	2.3	166	1.3
Trade, Transportation, and Utilities	1,707	23.3	3,031	22.8
Information Services	193	2.6	136	1.0
Financial Activity	177	2.4	537	4.0
Professional and Business	206	2.8	684	5.2
Education and Health	349	4.8	966	7.3
Leisure and Hospitality	374	5.1	976	7.3
Other Services	184	2.5	365	2.7
Government	1,938	26.4	2,835	21.3

Employment Sector	Duchesne County		Uintah County	
	Jobs	**% Total**	**Jobs**	**% Total**
Total	**7,331**	**100.0**	**13,280**	**100.0**

Percentages may not total 100 percent due to rounding.
Source: 2011 Economic Report to the Governor, Utah Governor's Office of Planning and Budget, 2011.

Data from the Utah Department of Workforce Services (DWS) show that the 2011 unemployment rate was 5.5 percent in Duchesne County and 5.1 percent in Uintah County. Both rates were below the statewide rate of 6.7 percent. In 2011, Duchesne County gained 684 positions, while Uintah County gained 909 positions. Employment levels in Utah fell between 2008 and 2010, but increased in 2011 (DWS 2012). The state unemployment rate began falling in late 2010, and that pattern continued through 2011. Unemployment is expected to continue falling through 2013, with the unemployment rate projected to decline to 5.9 percent. Employment in Utah is projected to grow 3.2 percent during 2013, as compared to 1.3 percent for the U.S. (GOPB 2012).

After a 2-year hiatus, the Uinta Basin (which includes Duchesne and Uintah Counties) has seen a 2 percent decrease in the unemployment rate (Shelly Ivie, Assistant Director, DWS, pers. comm.). according to DWS data, the region's average unemployment rates in 2009 and 2010 were above the state average but below the national average. That changed in 2011, when the unemployment rate for Duchesne County fell to 5.9 percent and Uintah County's fell to 5.4 percent. By comparison, the state unemployment rate average for 2011 was 7.1 percent, and the national average was 8.9 percent. In December 2011, Utah's economy added 6,052 jobs over the same month in the prior year. More than 1,700 of these jobs – approximately 28 percent of the total – occurred in Duchesne and Uintah Counties (Deseret News, March 7, 2012).

In 2010, per capita income was $21,787 in Duchesne County and $24,160 in Uintah County. Both figures were close to the State of Utah average of $23,139 and lower than the national average of $38,564. Utah is unique when comparing personal income and median household income to other parts of the country. Although Utah has a very low per capita personal income, the state's median household income is ranked tenth highest in the nation. This is due to the fact that Utah has the largest household size in the nation, and per capita figures are diluted by a larger number of children. As such, median household figures provide a more accurate measure of family income. In 2010, Utah's median household income of $56,330 was 108 percent of the national average of $51,914 (U.S. Census Bureau 2010). Although no median household income statistics are available for Duchesne and Uintah Counties, based on the information presented above, it can be assumed that the median household income is comparable to the national average.

Due to the level of oil and gas development taking place within the Uinta Basin, the average per capita income in Duchesne and Uintah Counties has steadily increased in recent years. Between 2006 and 2010, per capita incomes for both counties increased by about 10 percent annually (U.S. Census Bureau 2010).

Table 3.16.2-2 shows non-agricultural payroll wages in Duchesne and Uintah Counties by employment sector, with state wages included for comparison. When comparing **Tables 3.16.2-1** and **3.16.2-2**, it is apparent that payroll from natural resources and mining comprises a high percentage of the total wages in Duchesne and Uintah Counties, relative to the total employment within the sector. Wages from this sector account for a much larger percentage of total non-agricultural payroll wages in both counties than it does for the State of Utah as a whole.

Table 3.16.2-2. Non-Agricultural Payroll Wages by Employment Sector, 2010

Employment Sector	Duchesne County		Uintah County		State of Utah	
	Wages (millions)	% of Total	Wages (millions)	% of Total	Wages (millions)	% of Total
Natural Resources and Mining	104.9	34.5	172.2	30.8	736.3	1.6
Construction	23.3	7.7	44.9	8.0	2,745.3	6.0
Manufacturing	7.0	2.3	5.3	0.9	5,475.9	11.9
Trade, Transportation, and Utilities	64.8	21.3	126.2	22.6	8,127.5	17.7
Information Services	7.4	2.4	4.5	0.8	1,498.9	3.3
Financial Activity	5.7	1.9	26.7	4.8	3,380.1	7.4
Professional and Business	8.9	2.9	27.0	4.8	7,136.1	15.6
Education and Health	11.3	3.7	27.6	4.9	5,431.7	11.8
Leisure and Hospitality	4.2	1.4	12.5	2.2	1,759.9	3.8
Other Services	6.9	2.3	11.7	2.1	951.0	2.1
Government	59.4	19.6	100.9	18.0	8,633.6	18.8
Total	**303.8**	**100.0**	**559.5**	**100.0**	**45,876.2**	**100.0**

Percentages may not total 100 percent due to rounding.
Source: 2011 Economic Report to the Governor, Utah Governor's Office of Planning and Budget 2011.

3.16.3 Taxes and Revenues

Oil and gas operations contribute considerable revenue to various federal, state, and local governmental entities through payment of various royalties and taxes. Revenue types and amounts that are received by the Ute Indian Tribe are confidential, and therefore are not disclosed in this document. The types of revenue that oil and gas development typically generates is discussed below.

3.16.3.1 Federal Mineral Lease Royalties

Federal mineral lease royalties are collected from oil and gas, gas plant products, Gilsonite, and phosphate extraction operations that are located on federally-held mineral deposits. At present, the federal royalty rate is approximately 12.5 percent of the total production rate. Typically, federal mineral leasing regulations require that 50 percent of gross revenues collected from mineral lease royalties be returned to the state of origin. The BLM subtracts a management fee for disbursing funds and currently sequesters an additional 5.1 percent. The actual royalties returned to the State of Utah are approximately 43 percent.

3.16.3.2 State Mineral Lease Royalties

Similar to Federal mineral royalties, the State of Utah receives mineral lease royalties at a rate of approximately 12.5 percent for all oil and gas development on State lands. SITLA manages all state lands within the MBPA. As an independent agency, SITLA manages lands that were granted to the State of Utah by the United States predominantly for the purpose of supporting public schools and academic institutions. Oil and gas royalties are the largest source of trust land revenue within the State of Utah.

3.16.3.3 Sales and Use Tax Revenue

Oil and gas operators pay sales taxes when they purchase equipment, materials, or supplies in the local area. Examples of purchases that generate sales tax revenue include gravel, pipe, fuel, and other supplies purchased locally. Like property tax revenue, local cities and counties use sales and use tax revenues to fund a wide variety of important local services and community facilities. As of April 1, 2012, the Utah sales and use tax rate was 4.70 percent. In addition to the State sales tax, all counties, cities, and towns are entitled to impose an additional 1 percent local sales tax. Counties may also impose an “option sales tax” of 0.25 percent. Duchesne County imposes all 3 sales taxes for a combined rate of 5.95 percent. Uintah County imposes these same three 3 sales taxes combined with a “cultural, botanical and zoo” sales tax of 0.1 percent, for a combined rate of 6.05 percent (Utah State Tax Commission 2012a).

3.16.3.4 Severance Tax

The State of Utah levies severance tax on oil and gas that is produced, saved, sold, or transported from the field where it was produced. These taxes are paid on crude oil, condensate, unprocessed gas, residue gas, and natural gas liquids. Currently, severance taxes are collected at a split rate. The first $13.00 per barrel of oil is taxed at a rate of 3 percent, and the amount above $13.00 is taxed at 5 percent.

Oil and mining severance tax is one of Utah’s eight (8) major tax revenue sources, which also include taxes on sales and use, income, corporate franchises, insurance premiums, beer, cigarettes, and tobacco. In fiscal year 2011, the State of Utah collected $59,855,286 in severance tax (Utah State Tax Commission 2012b). Severance taxes are paid to the Utah State Tax Commission and deposited into the State’s general tax fund. Because taxes are paid directly to the State of Utah, collection information is not available on a per county basis. However, due to the prevalence of oil and gas activity within the Uinta Basin, it can be assumed that the majority of severance tax collected by the State originates in Duchesne and Uintah Counties.

3.16.3.5 Conservation Tax

The Utah State Tax Commission collects a conservation tax at a rate of 0.2 percent of the value of oil, gas, and natural gas liquids that are produced, saved, and sold, or transported from the production site of a well. It applies to all interest owners in the well. Revenue generated from the conservation tax is paid to the State Tax Commission and deposited into the State’s general tax fund. During fiscal year 2011, the State of Utah collected about $5,784,545 from conservation fees (Utah State Tax Commission 2012).

3.16.3.6 Property Tax Revenue

Among the most important sources of revenue for county governments are property taxes levied on locally and centrally assessed property. Within the State of Utah, slightly more than half of property tax revenue (53.29 percent) is allocated to school districts. Another 19.65 percent is distributed to the counties, 13.75 percent is dispersed to special districts, and the remaining 13.25 percent is distributed to cities and towns (Utah State Tax Commission 2012).

Given their relatively high assessed value, oil and gas exploration and production contributes to a substantial portion of a county's property tax base. **Table 3.16.3.6-1** provides a summary of property taxes associated with oil and gas development for the counties within the MBPA.

Property taxes collected on natural resources within the State of Utah totaled approximately $118.9 million in fiscal year 2011, which is approximately 4.6 percent of the total property taxes collected (Utah State Tax Commission 2012). According to the 2010 Annual Statistical Report, approximately 37 percent of the property taxes levied on natural resources are associated with oil and gas extraction (Utah State Tax Commission 2011).

Table 3.16.3.6-1. Property Taxes Levied on Oil and Gas Exploration and Production within Duchesne and Uintah Counties

County	Property Class	2008		2009		2010	
		Taxable Value ($million)	Taxes Charged ($million)	Taxable Value ($million)	Taxes Charged ($million)	Taxable Value ($million)	Taxes Charged ($million)
Duchesne	Oil & Gas Extraction	516.4	5.8	548.0	6.3	521.1	6.2
	Pipeline & Gas Utilities	38.2	0.43	38.3	0.44	37.6	0.45
Uintah	Oil & Gas Extraction	2,000.8	19.3	2,091.4	20.7	2,117.5	21.7
	Pipeline & Gas Utilities	163.3	1.6	166.0	1.7	159.0	1.6

Source: Annual Statistical Reports, Utah State Tax Commission, 2009-2011.

Due to the level of oil and gas development within the Uinta Basin, Duchesne and Uintah Counties derive more benefit from property taxes associated with oil and gas activities than the state as a whole. Statewide, 1.7 percent of total property taxes that were levied on locally and centrally assessed property were derived from oil and gas extraction. However, 33 percent of such property taxes in Duchesne County and 46 percent in Uintah County were derived from these activities. The combined property taxes that were levied on oil and gas extraction in Duchesne and Uintah Counties comprised nearly 63.5 percent of the total oil and gas extraction property taxes levied statewide (Utah State Tax Commission 2011).

3.16.3.7 Surface Use Agreements

Split-estate is separate ownership of the land surface and of the mineral deposits associated with it. In most cases, mineral developers must occupy and conduct activities on a portion of a surface property to develop the underlying minerals. Under State of Utah law, mineral owners have entry and development rights, provided that surface owners are adequately compensated for the land use and disturbance. In cases where mineral and surface ownership are held in split-estate, mineral developers and the surface land owner typically enter into a surface use agreement (SUA). The specific details of a SUA are negotiable. In general, SUAs allow the surface land owner to discuss an initial fee and annual fees. Land owners also frequently receive compensation for any loss of income incurred by the mineral development.

3.16.4 Quality of Living

3.16.4.1 Public Facilities and Services

The Duchesne County Sheriff's Department has one office with 50 full-time employees, of which 37 are sworn officers. The County Jail is a 160-bed facility that houses County and contract inmates from the State of Utah and Bureau of Indian Affairs (Duchesne County Sheriff's Department website, 2012). Information about the number of persons employed by the Uintah County Sheriff's Department is not available, and attempts to contact the Sheriff's Department for information were unsuccessful. However, according to information from the Utah Department of Corrections, Uintah County has completed a new 384-bed jail (Utah Department of Corrections 2013).

For those areas not covered by the BLM, Forest Service, or Indian trust lands, volunteer fire departments within each county provide fire protection and hazardous materials response. Duchesne County has seven fire departments serving the community, of which four are city fire departments and three are county fire departments. The county has 95 volunteer firefighters available (Duchesne County Emergency Management website 2012). Uintah County has five fire departments serving the community, of which four are city fire departments and one is a combined city and county fire department. There are a total of 86 volunteer firefighters (Uintah County Emergency Management 2012).

The Uinta Basin Medical Center, a 42-bed general hospital located in Roosevelt, provides medical services for Duchesne County (Uintah Basin Healthcare 2012). This facility is currently adding three (3) buildings. The Ashley Regional Medical Center, a 39-bed acute care facility located in Vernal, provides medical services for Uintah County (Ashley Regional Medical Center website 2012).

The Duchesne County School District provides educational services to approximately 4,450 students in 13 schools that are located in six rural communities, of which six are elementary schools; one is a junior high school; three are high schools; one is a K-12 school; and two are special needs schools (Duchesne County School District website 2012). Uintah School District provides educational services to approximately 6,200 students in 11 schools, of which seven are elementary schools; one is a middle school; one is a junior high school; one is a high school; and one is an alternative school (Uintah County School District 2012).

Duchesne County's other services include two branches of the public library, which are located in the cities of Roosevelt and Duchesne. Other county services in Uintah County include a public library, a recreation center, and two senior service centers in Roosevelt and Duchesne. All of these facilities are located in Vernal.

3.16.4.2 Crime

The Utah Bureau of Criminal Identification, a division of the Utah Department of Public Safety produces semiannual reports on crime statistics for the State of Utah. According to the *Crime in Utah Semiannual Report*, issued for the period of January - June 2011, total crimes in Utah decreased 7.14 percent from the same time period in 2010 (Utah Department of Public Safety 2011). Total arrests in Duchesne County decreased from 826 in 2008 to 521 in 2010. In Uintah County, total arrests decreased from 3,592 in 2008 to 3,521 in 2010 (Utah Department of Public Safety 2009-2011).

3.16.4.3 Housing

According to the 2010 U.S. Census, there were 9,493 housing units in Duchesne County. Approximately 70.1 percent of these housing units were single-family detached or attached homes. Approximately 6.3 percent were structures with two to four units (i.e., duplexes and fourplexes), and 2.9 percent were structures with five units or more. A significant percentage of housing units (20.5 percent) were mobile homes. Of the total housing units, 6,003 units were occupied and 3,490 units were vacant. However, 2,803 of these vacant units were set aside for seasonal, recreational, or occasional use, which account for nearly 80 percent of all vacant units. There were 248 vacant residential units in Duchesne County available for sale or rent in 2010 (U.S. Census Bureau 2010).

In Uintah County, there were 11,972 housing units in 2010. Approximately 73.0 percent of these housing units were single-family detached or attached homes. Approximately 7.0 percent were structures with two to four units, and 4.1 percent were structures with five units or more. Approximately 13.7 percent were mobile homes. Of the total housing units, 10,563 units were occupied and 1,409 units were vacant. Relatively few of these vacant units were set aside for seasonal, recreational, or occasional use because only 313 such units were available. There were 644 vacant residential units in Uintah County available for sale or rent in 2010 (U.S. Census Bureau 2010).

Historically, local housing was concentrated in the cities of Roosevelt and Vernal. However, new housing construction has recently been showing up in unincorporated parts of the counties; more than 85 percent of the building permits issued in Duchesne County were for homes located in unincorporated areas, with only a slightly lower share of all permitted units located in unincorporated Uintah County (BLM 2010a).

Local housing costs have increased sharply in recent years due to strong demand and more households with higher income levels. Consequently, housing affordability had been as much an issue as availability prior to the recent economic downturn. **Table 3.16.4.3-1** shows that the average sales price of homes sold in the Uinta Basin increased by 82 percent between 2004 and 2007, before declining in 2008. Increases in local housing prices outpaced the statewide increases such that the local average sale price climbed from 61 percent of the statewide average in 2004 (excluding Park City) to 85 percent in 2007. Sales prices in the Uinta Basin declined faster than the statewide average during the latter part of 2008, lowering the ratio of local to statewide prices to 78 percent.

As indicated in **Table 3.16.4.3-1**, the strong local demand for housing also is reflected in the increase in the number of sales. Housing sales climbed from 427 in 2004 to 634 in 2006, and remained close to this level in 2007 and 2008. Sales fell sharply to 342 in 2009, mainly due to economic conditions. Since 2009, home sales have risen substantially with home sales in 2011 exceeding those in 2006.

Table 3.16.4.3-1. Home Sales and Average Prices in the Uinta Basin

Year	Number of Sales	Average/Median Sales Price of Homes Sold	Local Price as Percent of State Average/Median[1]
2004	427	$115,144	61.0%
2005	544	$137,798	69.6%
2006	634	$172,132	74.5%
2007	555	$209,496	85.2%
2008	625	$187,762	78.2%
2009[2]	342	$198,000	99.4%
2010[2]	491	$156,150	82.2%
2011[2]	652	$150,000	85.8%

[1] Based on State average not including Park City.
[2] Beginning in 2009, statistics were kept for Duchesne and Uintah Counties separately, rather than for the Uinta Basin as a whole. Also, median sales prices were recorded rather than average sales price. Median sales price in this table is the higher of the median sales price recorded for Duchesne or Uintah Counties.
Source: Utah Association of Realtors.

Housing availability in Duchesne and Uintah Counties has improved somewhat in the wake of the national economic recession. The slowdown has reduced the pace of oil and gas development and increased unemployment, triggering some out-migration of workers and easing demand on housing. A search of a nationwide listing service from the National Association of Realtors found 149 residential properties listed for sale within 10 miles of Roosevelt, and 213 such properties within 10 miles of Vernal. Single family homes in both areas range in price from approximately $40,000 to greater than $1,000,000 (Realtor.com 2012).

A resident workforce combined with workers who live in the area on a temporary basis but maintain a permanent home elsewhere support crude oil and natural gas development in Duchesne and Uintah Counties. The latter reside in motels, field camps, rental housing, and recreational vehicles (RVs), which can be parked at commercial campgrounds. The study area has a large existing stock of motel rooms and RV campgrounds. This includes more than 1,000 motel rooms and 500 commercial RV spaces (year-round and seasonal) in the vicinity of Vernal, Roosevelt, and Duchesne (Dinosaurland Travel Board 2012).

3.16.5 Environmental Justice

Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations, and policies (EPA 1998a). Consideration of environmental justice issues is mandated by EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which was signed by President Clinton in 1994. This EO requires "each Federal agency [to] make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high adverse human health and environmental effects of its programs, policies and activities on minority populations and low-income populations" (EPA 1994). Implementation of EO 12898 for NEPA by agency directive involves the following steps (BLM 2002b):

- Identification of the presence of minority and low-income populations and Indian Tribes in areas that may be affected by the action under consideration.
- Determination of whether the action under consideration would have adverse human health, environmental, or other effects on any population.
- Determine whether such environmental, human health, or other effects would be disproportionately high and adverse on minority or low-income populations or Indian Tribes.
- Providing opportunities for effective community participation in the NEPA process, including identifying potential effects and mitigation measures in consultation with affected communities and improving the accessibility of public meetings, crucial documents, and notices (EPA 1998a).

The EPA defines a community with potential environmental justice populations as one that has a greater percentage of minority or low-income populations than an identified reference community (EPA 1994). The EPA standard for identifying minority populations is typically either (1) the minority population of the affected area exceeds 50 percent; or (2) the minority population percentage of the affected area is "meaningfully greater" than the minority population percentage in the general population or other appropriate unit of geographic analysis, such as a reference community. For environmental justice compliance, the relevant minority population is the total minority population comprising all persons of a minority racial identity combined with persons of Hispanic origin (BLM 2002b). For this analysis, it is assumed that an environmental justice population is likely to exist if the affected area's minority and/or poverty status is 50 percent or greater than the reference community. The BLM standard for identifying a low-income population is the poverty level used by the U.S. Census Bureau (CEQ 1997).

Table 3.16.5-1 summarizes the proportions of low-income, minority, and Tribal populations in communities and census designated places (CDPs) associated with the MBPA. The table includes the main communities in each county in the MBPA as well as the three communities within the Uintah and Ouray Reservation. For the purposes of assessing the presence of environmental justice communities, Duchesne County, Uintah County, and the cities therein are considered the reference communities. The Reservation communities are referred to as CDPs, which are defined as unincorporated communities with boundaries defined for purposes of enumeration during the decennial census. For comparative purposes, State of Utah percentages are also provided.

Table 3.16.5-1. Income and Minority Characteristics of Selected Communities Associated with the MBPA

Community	Percent of Total Population in Poverty	Minority Race or Hispanic as a Percent of Total Population	Percent American Indian
Duchesne County	**12.4**	**11.3**	**4.5**
Duchesne City	12.5	5.0	0.7
Myton	20.1	24.5	8.6
Roosevelt	18.7	18.5	8.2
Uintah County	**11.7**	**15.9**	**7.7**
Vernal	15.6	9.0	2.2
Naples	6.2	10.2	1.0
Ballard	7.4	11.8	4.7
Uintah and Ouray Reservation*	**20.2**	**17.5**	**14.5**
Fort Duchesne CDP	55.0	95.2	90.2
Randlett CDP	54.0	96.4	93.3
Whiterocks CDP	74.0	94.7	93.8
State of Utah	**11.4**	**24.2**	**1.2**

* Data not updated since 2000.
Sources: U.S. Census Bureau 2010; 2007-2011 American Community Survey

The data in **Table 3.16.5-1** suggests that the Tribal communities on the Uintah and Ouray Reservation are the primary areas of concern. The communities with a poverty rate of over 50 percent include Fort Duchesne CDP, Randlett CDP, and Whiterocks CDP, which has the highest poverty rate (74 percent) of the communities evaluated. By comparison, poverty rates in the reference communities range from 20.1 percent in Myton to 6.2 percent in Naples. The table also shows that the Reservation communities are predominantly minority communities, each having greater than 90 percent of its population a minority race, mainly American Indian. The concentration of the American Indian population in the three CDPs is consistent with a 1994 survey of the Ute Tribe members, in which 64 percent of the respondents living on the Reservation reported their residence in Whiterocks, 16 percent in Fort Duchesne, and eight 8 percent in Randlett. The remaining survey respondents cited places of residence not enumerated by the U.S. Census Bureau (BLM 2011d). The minority population percentages elsewhere in Duchesne and Uintah Counties, including rural areas near the MBPA, are not meaningfully higher than the reference communities or the State, except for Myton. Myton has a higher minority population percentage than Duchesne County; however, it is not meaningfully higher than the State percentage.

In summary, economic and demographic data from the 2010 U.S. Census and the 2007-2011 American Community Survey indicate several concentrations of minority and/or low-income populations residing north of the MBPA, thus meeting the BLM standard for analysis of potential environmental justice communities.

3.16.6 Ute Indian Tribe

3.16.6.1 Demographics

Portions of the MBPA border the Uintah and Ouray Indian Reservation. Established in 1861, the Reservation is Utah's largest, with approximately 1.4 million acres, and is the home of the Ute Indian Tribe. The Reservation is approximately one-third of its original 4-million acre size. In a series of land takings by the U.S. Government, the Reservation was gradually reduced piecemeal in the early 1900s. Throughout the last century, ongoing legal disputes over land ownership and water have resulted in the expansion of the Reservation to its current size.

As of 2010, the population of the Reservation was 24,369 residents; however, only 3,457 residents are American Indian (U.S. Census Bureau 2010). There are 3,090 recognized members of the Ute Tribe. Approximately 66 percent of those with Tribal membership currently live on the Reservation or on off-Reservation trust land (Utah Division of Indian Affairs 2011). There were 7,788 households on the Reservation in 2010. Of these, 78.4 percent were family households, and 17.8 percent had a householder living alone. The average household size was 3.09 persons, while the average family size was 3.52 persons (U.S. Census Bureau 2010).

As of 2010, a total of 11,695 housing units were located on the Reservation. Approximately 66.5 percent of these units were occupied. Of these occupied units, 77.8 percent were owner-occupied, either free and clear or with a mortgage. Most of the vacant housing units (76.6 percent) were set aside for seasonal, recreational, or occasional use (U.S. Census Bureau 2010).

3.16.6.2 Local Economy and Employment

A variety of industries help sustain the Tribal economy. **Table 3.16.6.2-1** provides a breakdown of the job sources for the Reservation (Ute Indian Tribe) by employment sector. The largest source of employment that brings revenue into the Reservation is education, health, and social services. This sector accounts for 20.5 percent of employment for population 16 years of age and over. Other significant employment sectors include agriculture, forestry, mining, and fishing and hunting; retail trade; public administration; transportation, warehousing and utilities; and arts, entertainment, recreation, accommodation, and food services. Almost one-fourth (24.3 percent) of the Reservation's working population is employed by the government. Most of the remaining workers are employed by the private sector, with approximately 6.4 percent self-employed (U.S. Census Bureau 2011).

According to the U.S. Census 2007-2011 American Community Survey 5-Year Estimates, the unemployment rate for the population on the Reservation 16 years and older was 3.4 percent. This rate was lower than the average unemployment rate in the State of Utah (6.5 percent) and the United States (8.7 percent).

Table 3.16.6.2-1. Job Sources for the Reservation (Ute Indian Tribe) by Employment Sector

Employment Sector	Number of Jobs	Percent of Total
Agriculture, Forestry, Mining, and Fishing and Hunting	1,647	18.1
Construction	644	7.1
Manufacturing	133	1.5
Wholesale Trade	202	2.2
Retail Trade	918	10.1
Transportation, Warehousing, and Utilities	739	8.1
Information	271	3.0
Finance, Insurance, Real Estate and Rental and Leasing	245	2.7
Professional, Scientific, Management, and Administrative Services	461	5.1
Education, Health, and Social Services	1,871	20.5
Arts, Entertainment, Recreation, Accommodation, and Food Services	714	7.8
Other Services	409	4.5
Public Administration	866	9.5
Total	**9,120**	**100.0**

Percentages do not total 100.0 percent due to rounding.
Source: 2007-2011 American Community Survey 5-Year Estimates, U.S. Census Bureau 2011.

According to the U.S. Census 2007-2011 American Community Survey 5-Year Estimates, the median income of Reservation households was $56,100, which was lower than that for the State of Utah ($57,783) but higher than that for the national median income ($52,762). Approximately 9.2 percent of all families on the Reservation lived below the poverty level within the past 12 months, compared with 8.3 percent in Utah and 10.5 percent in the United States. Among American Indian families residing on the Reservation, the poverty level was 18.3 percent. Because poverty thresholds in the United States are determined by a combination of factors (i.e., age, income, and family size) no single standard currently exists by which a family is determined to be in poverty. Nevertheless, for a family of three with one child, the 2007-2011 American Community Survey calculates that the poverty level is $17,438 (U.S. Census Bureau 2011).

Under Ordinance No. 92-07, the Ute Indian Tribe established a Contracting Preference Ordinance for all Reservation employers. Passed in 1992, this Ordinance requires enterprises doing business within the Reservation to employ, to the greatest extent possible, Tribal members and Tribally-owned subcontractors.

3.16.6.2.1 Ute Tribal Fiscal Conditions and Revenues from Oil and Gas Activities

Revenue generated through mineral extraction is an important source of income for Tribal members. At the present time, a complex mix of surface ownership of mineral rights exists within the Reservation; however, many of the minerals located beneath the Reservation are generally owned by Tribal allottees or the Ute Indian Tribe. For Indian trust mineral ownership, lease royalties are collected. The mineral lease rate on Indian trust minerals is typically between 12.5 and 18 percent of the gross value of the resource being sold. The exact mineral lease rate on Indian trust lands is not disclosed because it is considered confidential information.

In addition to collecting mineral lease royalties, the Tribe levies a severance tax on all oil and gas that is produced, transported, or sold. Severance taxes are collected at a rate between 4 and 8 percent of the gross value of the resource being sold.

In areas where surface and mineral ownership are held in split estate, the Tribe collects revenue by entering into SUAs. SUAs provide compensation for the disturbance and/or the loss of income (e.g., agricultural land and crop production lost as a result of oil and gas development). Revenue from SUAs in the MBPA is negotiated with the Tribe on a case-by-case basis.

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